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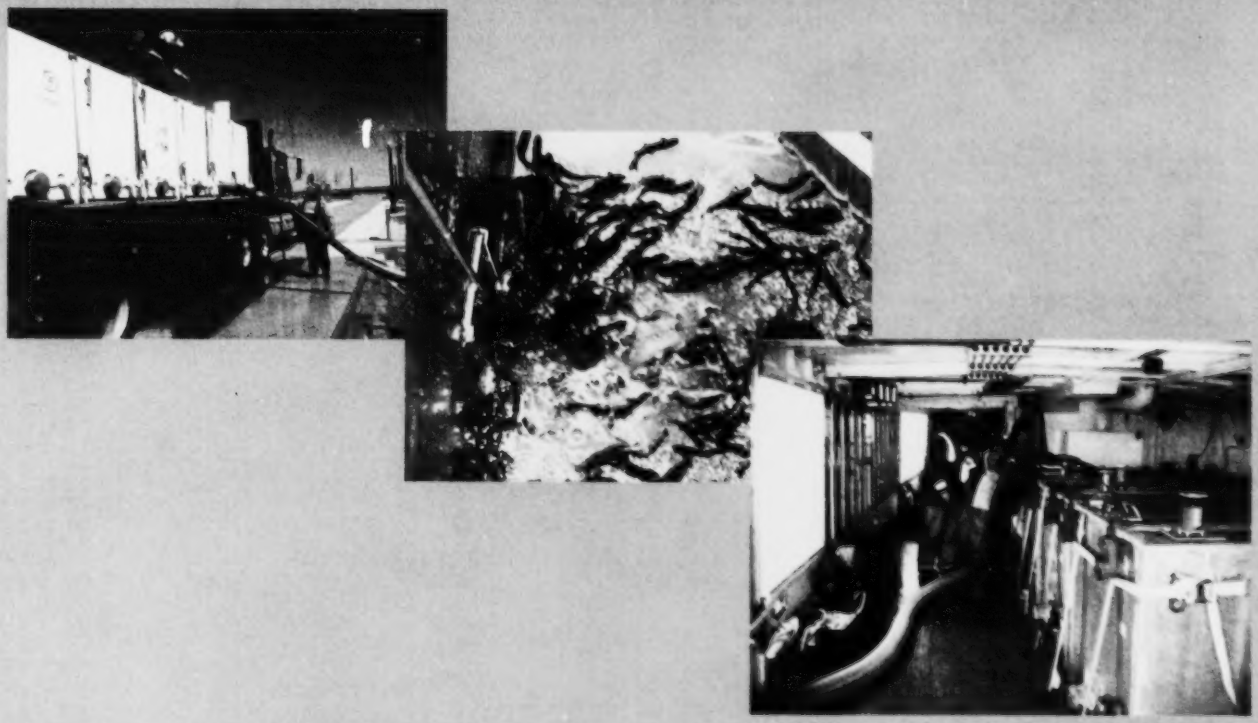

Fisheries and Oceans

LAKE SUPERIOR LAKE TROUT STOCKING REVIEW
and
STOCKING PLAN UPDATE
2009

Upper Great Lakes Management Unit –Lake Superior

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Introduction

Prior to European exploration and settlement of the Great Lakes basin, Lake Trout were the dominant deep water predators in the Great Lakes. Habitat destruction, high commercial harvests and the introduction of Sea Lampreys[1] all but extirpated Lake Trout from the lower lakes such that stocks were non existent or found only in a few refugia by the mid 20th century. In Lake Superior Lake Trout stocks collapsed in the 1950s following a prolonged period of commercial over fishing and later in the same period due to growing and uncontrolled lamprey predation (Hanson 1996). However, stocks were not depleted to the low levels of the other lakes before action was taken.

Prior to this collapse, Lake Trout were found across Lake Superior in a variety of body forms and colouration (morphological variants) that resulted in up to twelve colourful local names such as redfin, yellowfin, sand trout, fats and paperbelly (Goodier 1982). Following the introduction of Sea Lampreys many of these variants quickly disappeared. Loftus (1958) reported the collapse of two river spawning stocks associated with the Dog and Montreal Rivers. Not only did the lake suffer a serious decline in its dominant top predator but also the unique genetic and phenotypic variations that made up the lakewide population.

Management agencies responded to the urgency of the situation by closing or severely limiting Lake Trout commercial fisheries around the lake (Lake Superior Lake Trout Technical Committee 1986) and in 1958 chemical control of Sea Lampreys was initiated. From this time forward agencies recognized Lake Trout rehabilitation required three separate actions: 1) fishery closures, 2) Sea Lamprey control, and 3) rehabilitative stocking. By the 1980's response to these actions had been sufficient enough that a limited commercial and sport fishery was permitted. While fisheries management agencies currently recognize three forms of Lake Trout – leans, siscowets, and humpers (Horns et al. 2003), stocking has been focused on the rehabilitation of the lean form for the past four decades (Horns et al. 2003). The other two forms were not as economically important and neither were they as severely affected by over fishing and subsequent Sea Lamprey predation.

Fish culture in Ontario[2]

The Ontario Ministry of Natural Resources Fish Culture Section operates ten provincial fish culture stations (FCS), two of which raise the lean form of Lake Trout for stocking into Lake Superior (Dorion FCS and Tarentorus FCS). These Lake Trout, as virtually all other fish species raised in the system, are of wild origin. Science based management of brood stock and genetic testing are employed to ensure these stocks remain wild.

As with all fish released into the wild these Lake Trout undergo disease inspection for known fish diseases. They are fed advanced diets designed to meet their nutritional requirements and minimize hatchery waste products. Nine months prior to stocking each Lake Trout fingerling is fin clipped according to a five year rotational protocol set up through the Great Lakes Fishery Commission for agencies stocking into each Great Lake (Table 1.0).

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[1] The construction of the Welland Canal between Lake Ontario and Lake Erie made all the Great Lakes accessible to Sea Lamprey, by creating a bypass to Niagara Falls.

[2] http://mnronline.mnr.gov.on.ca/spectrasites/f&w/fishculture/fishculture.cfm

Table 1.0. The Lake Superior fin clip rotation for 2000 to 2006.

Year	Fin clipped	Clip code
2000	Left pectoral	LP
2001	Right pectoral	RP
2002	Right ventral	RV
2003	Adipose	AD
2004	Left ventral	LV
2005	Left pectoral	LP
2006	Right pectoral	RP

While the Ministry employs a number of transportation systems (tanker truck, helicopter, boats) to get fish from the hatchery to the water, most Lake Superior Lake Trout have been stocked in deep water in association with offshore shoals by tug. From time to time, for hatchery operational reasons, shore stocking directly from the tanker truck occurs.

Lake Superior Stocking Rationale

Ontario recognizes a number of reasons for raising fish in artificial environments and stocking them in to the wild. Provincial stocking guidelines (OMNR 2002) identify five stocking objectives which are:

1. Introduction for public benefit
2. Rehabilitation of native or naturalized fish to a level that supports optimum sustainable yield
3. Artificial for hatchery dependent fishing opportunities
4. Research to support new knowledge in the management of fish stocks
5. Stock preservation to retain the genetic integrity of a stock when the native habitat can no longer sustain them.

Rehabilitation is the objective identified by all agencies with fisheries management responsibilities for Lake Superior and has resulted in a lakewide effort to rehabilitate wild lean Lake Trout stocks. Initially it was thought that once Sea Lamprey control had been achieved and the commercial fisheries closed, intensive stocking would result in a swift recovery of Lake Trout (Hansen 1996). In reality, the results between 1960 and early 1990s were mixed depending upon jurisdiction and lake location (Hanson 1996). The determining factors for localized success in Lake Superior appear to depend upon the stocking rates employed, survival of stocked fish, effectiveness of Sea Lamprey control, restrictions on Lake Trout harvest and degree of competition from increasing siscowet stocks. The 1996 Lake Trout Restoration Plan for Lake Superior (Hanson 1996) describes the role of stocking in the successes made towards rehabilitation and the obstacles that remain or have developed in the interim period.

Lake Trout Rehabilitation Objective

The Lake Superior Strategic Fisheries Plan 1986-2000 (OMNR 1987) objective for Lake Trout was:

> "To provide for the maintenance, protection and enhancement of Lake Trout populations and to provide recreational angling opportunities and commercial harvest for this species based on an optimum sustainable yield."

The 2003 Fish Community Objectives for Lake Superior (Horns et al.2003) Lake Trout objective is:

> "Achieve and maintain genetically diverse self-sustaining populations of Lake Trout that are similar to those found in the lake prior to 1940, with lean Lake Trout being the dominant form in nearshore waters, siscowet Lake Trout the dominant form in offshore waters, and humper Lake Trout a common form in eastern waters and around Isle Royale."

Realizing this objective has been challenging in some areas of the lake and met in others. Generally, where harvest has been controlled, Sea Lampreys are kept at below 10% of pre-control populations and stocked fish are surviving to maturity, rehabilitation has been achieved.

Control of Exploitation

Since the publication of the Lake Superior Strategic Fisheries Plan 1986-2000, some management changes have been implemented in Ontario waters that further support Lake Trout rehabilitation, or are in response to rehabilitation backsliding. While the daily angler creel remains at a limit of three fish, a conservation licence option of one fish per day was implemented in 1993 (Goodchild pers. comm.). The long time closed season for anglers of October 1 to November 30 was change to the new provincial standard of October 1 to December 31, in 2008. This change was part of the province wide implementation of OMNR's Ecological Framework for Fisheries Management. This is primarily an administrative change with respect to Lake Superior and not expected to affect harvest.

Restrictions on commercial fishing licences remain the same and individual quotas are increased or reduced in response to Lake Trout abundance and rehabilitative status. Quota reductions of over 60% were implemented in 1998 in three eastern Superior management zones (Figure 1) due to rehabilitation failure. Petzold (1997) outlines the history of Lake Trout recovery in these zones and discusses the causes of rehabilitation failure.

Control of Sea Lampreys

The Sea Lamprey control program is fully supported by both Canada and the United States. While control measures are increasingly sophisticated and include a number of approaches (chemicals, barriers, traps, sterile males and attractants), in Lake Superior periodic and localized increases in Sea Lamprey numbers do occur. The management objective for suppression of Sea Lampreys is for annual Sea Lamprey induced Lake Trout mortality to be <5% (Horns 2003). To achieve this, control efforts will have to continue and include two or more of the identified methods. Essentially Sea Lamprey control must continue in perpetuity as it will not be possible to exterminate them. Rehabilitated Lake Trout and other fish species are forever vulnerable.

Rehabilitative Stocking

The third rehabilitation action, stocking Lake Trout, has been underway in the Canadian waters of the lake since the 1960s. The overall number of Lake Trout stocked has varied annually, however millions of fish have been stocked with annual stocking numbers approaching two million in the 1980s.

In 1992 the Lake Superior Lake Trout Stocking Review (Powell and Atkinson 1992) set out rehabilitation achievement criteria such that stocking should cease if:

- Wild Lake Trout made up 50% or more of the commercial harvest

- The mean age of the commercial harvest was greater than 8 years
- The risk of excessive exploitation was low as defined by: 1) commercial trout quota being <0.25 kg/ha, 2) angler harvest <0.1 kg/ha and 3) whitefish quota in near shore zones (< 91 m depth) <five times the Lake Trout quota to avoid excessive Lake Trout bycatch.

Since 1992 the Ministry has added several other criteria as characterizing a restored population (Chase 2006). These include:

- An annual mortality <45%;
- Achieved a target standing stock of wild Lake Trout of 2.4 kg./ha.(age 4 and older) in water <50 fathoms; and
- At least 500 females age 9 through 17 from a stock available for spawning.

The Ministry of Natural Resources followed the 1986 recommendations of the Lake Superior Lake Trout Technical Committee and developed two separate broodstocks (Slate Islands and Michipicoten Island) from wild strains of lean Lake Trout. A third broodstock line (Mishibishu) was developed from two Lake Superior Lake Trout stocks that were stocked into Lake Mishibishu between 1958 and 1963 (OMNR Stocks Registry).

Slate Island Broodstock
The Slate Island broodstock came from Lake Trout captured on shallow shoals off the Slate Islands in northern Lake Superior. Captured fish exhibited morphological differences and were categorized as *blacks, yellowfins and redfins*. Both *redfins* and *yellowfins* were used to establish the broodstock. The 2006 Stocking Catalogue presents details on the collection and establishment of the Slate Island broodstock. Slate Island yearlings were directed to be planted in western Lake Superior (west of the Pic River).

Michipicoten Broodstock
The Michipicoten broodstock originated from fish taken from shallow shoals off Quebec Harbour and in False Harbour on Michipicoten Island. The collectors noted three different morphological differences among captured fish (*redfins, yellow fins, greys*) and the presence of migrant clipped fish. OMNR records note that only reproductive products from *redfins* were taken. The Stocking Catalogue (2006) presents details on the collection and establishment of captive broodstocks. Michipicoten Island yearlings were directed to be planted in eastern Lake Superior.

Mishibishu Broodstock
Lake Mishibishu and two other lakes in this drainage system west of Wawa are sanctuaries intended to hold wild Lake Trout for broodstock production and maintenance. The Stocking Catalogue notes that this broodstock originated from plantings into the lakes of 2+ year old fish hatched from eggs collected at the mouth of the Dog River and stocked into Mishibishu Lake in 1958 and probably northeastern Superior shoal spawners who's eggs were collected by a contract commercial fisher and released as age 3+ fish in Mishibishu, Mishi and Katzenbach Lakes in 1963 (Kerr 2006). Mishibishu origin sac fry were intended for planting in the Dog and Montreal Rivers to re-establish river spawning Lake Trout where they had occurred before Sea Lampreys arrived. These two populations underwent a precipitous decline in the 1950s as described on page three.

Recent genetic work comparing archived 1952 Dog River Lake Trout genetic material and the Mishibishu broodstock suggest that the 1950s Dog River population did not contribute any genetic diversity to this hatchery strain supposedly developed from Dog River and Superior shoal spawning sources. Contemporary wild fish in both rivers are a mix of relatedness to each other and the Mishibishu broodstock with no evidence of the historic Dog River strain (Halbsion 2006.)

Stocking History

Approximately one million Lake Trout were stocked annually into Canadian waters prior to 1980. From 1984 to 1992, numbers were between 1.2 and 2.1 million per year. Since 1992 the numbers have ranged from over 500,000 to almost one million (Table 2). The annual yearling target since 1992 has been 524,000 (Powell and Atkinson 1991). In addition to this number the hatcheries have been in the habit of stocking surplus fall or spring fingerlings from shore. These numbers have boosted the annual numbers stocked but no assessment has been done to determine what kind of contribution these younger fish make to the stocking effort. The 1986 Lake Trout Technical Committee of the Lake Superior Committee suggested that Lake Trout yearlings survive 4-10 times better than fall fingerlings (Lake Superior Lake Trout Technical Committee 1986).

The outcome of exploitation restrictions, effective Sea Lamprey control and successful stocking has resulted in Lake Trout numbers reaching near historic levels in most areas of the Canadian waters of the lake (Chase 2006).

Table 2.0. Annual stocking targets for Lake Superior (adapted from Powell and Atkinson 1991)

ZONE	NUMBER REQUIRED	STRAIN
4	32,000 yearlings	Michipicoten
9	100,000 yearlings	Slate Islands
28	500,000 sac fry*	Mishibishu
31	182, 000 yearlings	Michipicoten
33	210,000 yearlings	Michipicoten
	500,000 sac fry*	Mishibishu
TOTAL	100, 000 yearling Slate Island strain	
	424,000 yearling Michipicoten strain	
	1,000,000 sac fry Mishibishu strain	

* Sac fry recommendations were not followed when a preliminary survey of the two rivers to be stocked for rehabilitation of river spawning stocks proved to have remnant wild spawning runs (Petzold 1996, Chong 2006).

The 1991 Lake Superior Lake Trout Stocking Review set out stocking guidelines on a zone by zone basis based upon the criteria presented on page five of the Review. Stocking recommendations using these criteria were supported by records of the annual Lake Trout harvest vs. quota, mortality determination, mean age, size, and percent native trout from 1984 to 1990.

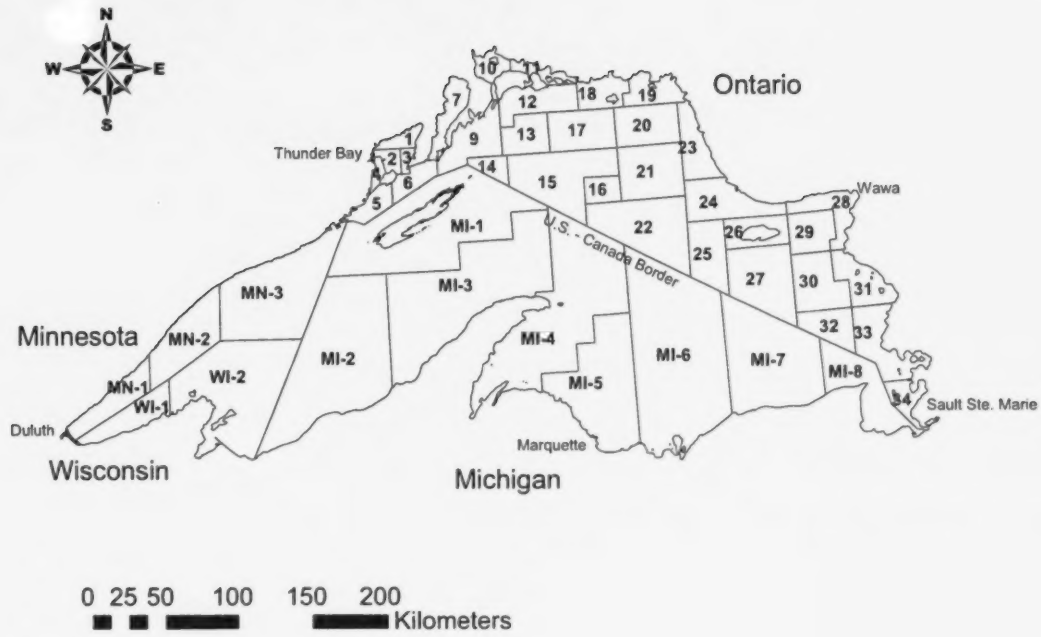


Figure 1.0. Map of Lake Superior Management Units.

General Recommendations

Conflict with other fishery goals

In the 1992 Stocking Report, uncertainty with respect to rehabilitation requirements for the collapsed herring fishery in Management Unit (MU) 7 resulted in a recommendation to defer stocking in preference of a management focus on the collapsed herring stocks. It was felt that a high Lake Trout bycatch remained possible during the limited fall herring fishery and therefore stocking was deferred. At that time the herring fishery targeted fish and not roe as in recent years and nets were set on the lake bottom. In recent times nets are set close to the surface where herring spawn, minimizing the Lake Trout bycatch.

Recommendation: Most of Lake Superior's nearshore management units have achieved or are approaching a state of recovery for lean Lake Trout stocks. In the event of a return to an impaired status, managers need to take into consideration other fishery goals and ecosystem responses to climate change that may have been established in the interim as they consider initiating a renewed stocking effort.

Lack of commercial fishery harvest and effort data

Commercial harvest data is used to track the percent native Lake Trout and the mean age in the commercial harvest as two stock status indicators. Over the past two decades market forces and lack of interest in commercial fishing, or a local dominance of native unregulated fishers, has resulted in changes in the number of licences issued each year. Consequently for some management units, commercial data has varied from year to year. This results in insufficient data to rely on commercial indicators of stock status to direct future stocking due to lack of fishing, not poor harvest results.

Recommendation When commercial fishing effort is consistently low other indicators of stock status from assessment surveys are important and should be used.

Sea Lamprey control
Mark Ebener (Lake Superior Technical Committee chair, personal communication) is of the opinion that average Sea Lamprey marking rates of 25 per 100 fish are excessive and mean that Sea Lamprey mortality plus natural mortality will leave little room for fishing mortality given a maximum mortality target of 45%. If Sea Lamprey mortality is 25% and natural mortality is 20%, then fishing mortality can be no more than 7%.

Recommendation: For all recovered zones under a new declining stock status condition there should be serious consideration to not stocking if lamprey wounding rates can not be controlled and are approaching 25 per 100 fish.

Surplus fish at various life stages
Hatcheries as a matter of practice take more eggs from their brood stock than are needed to produce the target number of yearlings for stocking. Over the growing period in the hatchery these eggs and resultant young fish are culled down to a level that will ensure that the stocking target can be met without undue expense. Live disposal of surplus, eyed eggs, fry or fall fingerlings is often into the target receiving waters upon agreement with the Lake Unit. Some of these fish are not clipped due to their development stage (eyed eggs and fry).

These surplus fish stocking events are not accounted for in this plan. They are however tracked in the OMNR Fish Stocking Information System and noted in the annual report of stocking activity to the Great Lakes Fishery Commission.

Recommendation: A general direction to the two fish culture stations that supply Lake Superior regarding disposal of surplus fish at all life stages should be developed. We recommend that release of these life stages into Lake Superior not occur.

Conflict with unregulated fishing
The Lake Unit's assessment of eastern Lake Superior Lake Trout stocks has demonstrated that stocked fish were supporting the unregulated gillnet fishery and not surviving long enough to contribute to the rehabilitation stocking goal (Petzold 1997) by spawning at least once.

Recommendation: For all zones we make a general recommendation to defer stocking if unregulated exploitation is occurring such that the total harvest exceeds the zone(s) total allowable commercials catch (TACC).

Refinement of lean Lake Trout habitat surface area.
Lean Lake Trout habitat is considered to be the nearshore waters less than 50 fathoms. Calculation of this area is an important determinant for recommending the numbers of fish to be stocked. The surface area calculated for the nearshore in each management unit were base upon those presented in the 1991 Lake Superior Lake Trout Stocking Review (Powell and Atkinson 1991). The source and calculation methodology for these values is not known.

Recommendation: With today's GIS capabilities we recommend that a more accurate calculation of lean Lake Trout habitat be made using up to date bathymetric data along with GIS layers delineating the management units and the Lake Superior shoreline. Data sources for the bathymetric data include the National Geophysical Data Center (NGDC) of the National Oceanic and Atmospheric Administration (NOAA) and the Canadian Hydrographic Service. The sources for the GIS layers are the Ministry's Natural Resources and Values Information System (NRVIS) and the Upper Great Lakes Management Unit. This will contribute to a more accurate determinate of the annual hatchery production needs for stocking. Managers and others will have a better understanding of habitat supply and lean Lake Trout production capabilities for each zone. The latter

benefit supports a Lake Superior Technical Committee research question, which seeks a better understanding of the relationship between habitat supply and fish production capabilities.

Management Unit Review and Specific Recommendations

In this Section each Management Unit is presented such that the reader can find summary information on:

- Location of the MU (map)
- Management Unit specific recommendations
- Stocking direction recommended in the 1991 Stocking Review
- 1992-2006 stocking activity in a table format
- Findings and action to date based upon stock assessment, commercial harvest, hatchery operations
- Trends in stock indicators (harvest, mean age, native fish abundance, growth at age and year class abundance) in graphic format
- Risk factors that may influence management decisions for stocking

General Comments
For the purposes of this report, lean Lake Trout habitat is considered to be nearshore waters less than 50 fathoms (fa) or 90 metres. The surface area of lean Lake Trout habitat in each MU is noted in the stocking activity tables. All stocking was in depths less than 50 fa in open water via tug (or other vessel) or from shore in some MUs.

The stocking rate in fish/hectare (ha.) presented in each MU stocking activity table is based upon review of empirical data as described in the 1991 Stocking Review. Stocking rates are noted as being 3.5 fish/ha. when Lake Trout densities are low and move to 2.5 fish/ha when an area is considered to be saturated with trout. The 1992 review did not define low or saturated densities. These stocking rates are supported by empirical data and field testing in the Keweenaw Bay area of Lake Superior (Powell and Atkinson 1992). For the purpose of this update we will continue to use these two stocking rates in our recommendations.

Trends in stock indicators for each zone, post 1992, include gaps in the data presented. This is due to a lack of commercial fishing data (no fishing or commercial sampling occurring) or lack of ability to conduct index assessment on a regular rotational schedule. Recent acquisition of a commercial gillnet vessel has permitted development of an annual fish community assessment schedule that will provide more timely data on the status of Lake Trout stocks.

Management Units 1-3

RECOMMENDATIONS

- **Stocking not required.**
- Maintain regular commercial and independent assessment to monitor stock status.
- If native Lake Trout decline such that they are <50% of the commercial harvest and the mean age of native fish in the harvest is <8 years, ensure this finding is communicated to the Lake Manager.
- If rehabilitative stocking is directed, stock off shore using Slate Island strain yearlings at a rate commensurate with current stock status.

Zones 1-3 Area: (ha)	
>50 fa	91,066
<50 fa	14,218
Total	105,284

Stocking Direction 1992-2006

- Stocking not required but zone should be monitored very closely for indicators of excessive harvest.
- Stocks are greater than 50% native and mean age is greater than 8 years.

Table 1.1. Recommended stocking rate, number stocked, and actual stocking rate from 1992 to 2006.

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Recommended stocking rate[1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Actual # stocked	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Actual stocking rate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

[1]Stocking rate units are number/ha

Actions to Date

- No stocking has occurred since 1984.
- Assessment of Lake Trout stocks occurred in 1999 and 2005.

Stock Status

- Mean age of commercial catch >8 years in last four reviews (Figure 1. 3).
- There has been >50% native trout in commercial harvest since 1991 (Figure 1.4).
- Growth of age 7 fish appears stable and above the 430 mm benchmark for the fishery (Figure 1.5).
- Most fish in commercial harvest are mature with many year classes present (Figure 1.6).

Risk

- Exploitation risk may be of concern as recent commercial harvests are well above the 0.25 kg/ha. guideline (Figure 1.1).
- Whitefish harvest is below recommended harvest guideline, which if exceeded could result in excessive Lake Trout bycatch (Figure 1.2).
- [illegible] is not monitored but understood to be limited.

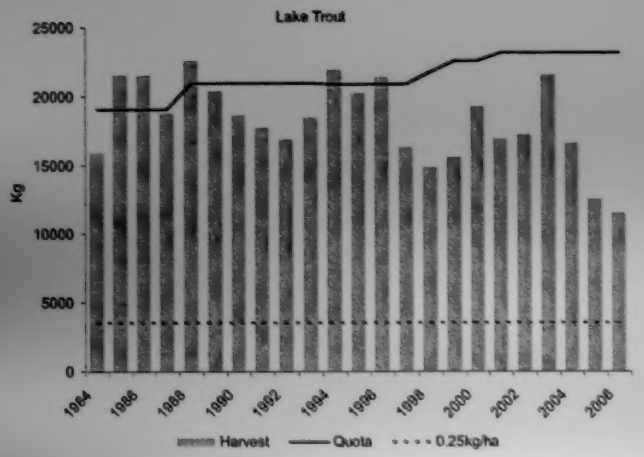


Figure 1.1. Lake Trout quota (solid line), harvest (bars), and 0.25 kg/ha harvest guideline (dashed line) for management unit 1-3.

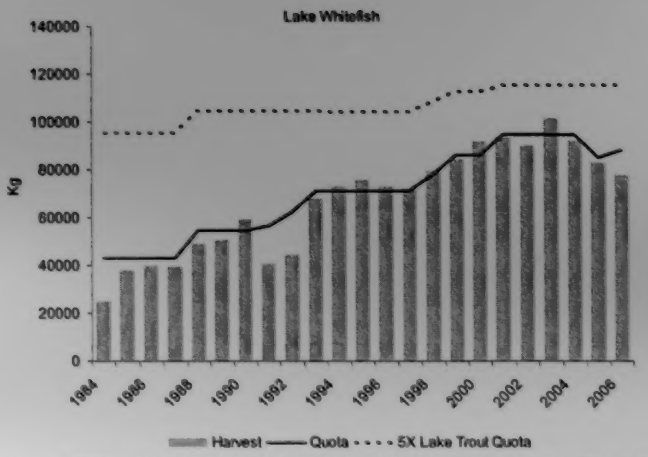


Figure 1.2. Lake Whitefish quota (solid line), harvest (bars), and Lake Whitefish harvest guideline (dashed line) for management unit 1-3.

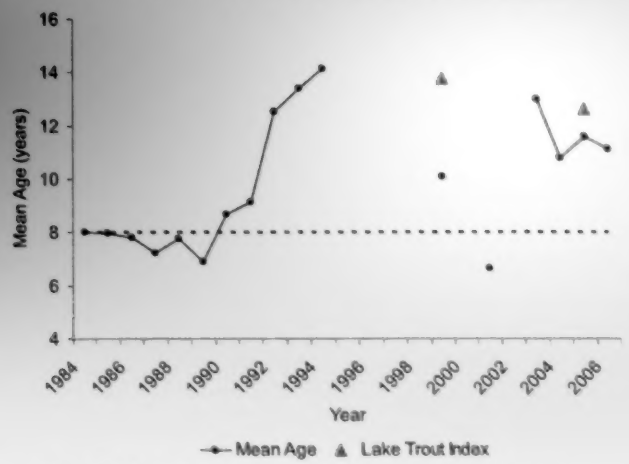


Figure 1.3. Lake Trout mean age (solid line) in the commercial harvest and Lake Trout index (triangle symbols) for management unit 1-3. Dashed line indicates a mean age of 8.

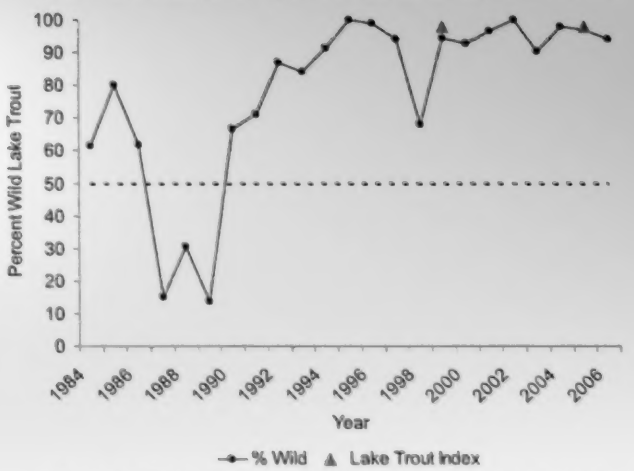


Figure 1.4. Percentage of wild Lake Trout (solid line) in the commercial catch and Lake Trout index (triangle symbols) for management unit 1-3. Dashed line indicates 50% wild Lake Trout.

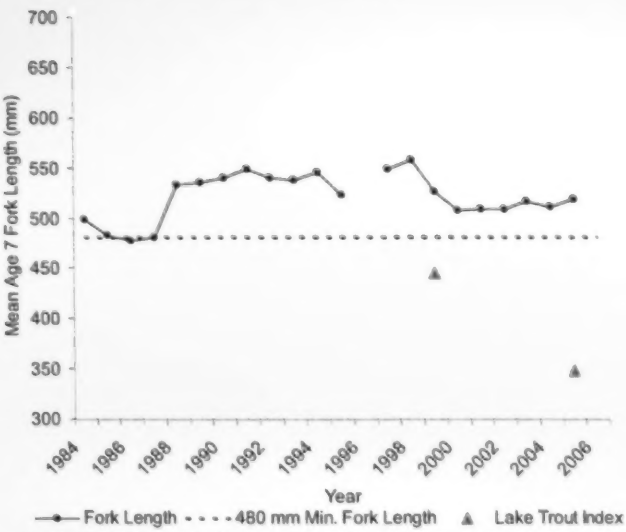


Figure 1.5. Lake Trout mean age 7 fork length (solid line) in the commercial harvest and Lake Trout index (triangle symbols) for management unit 1-3. Dashed line indicates a 480 mm fork length.

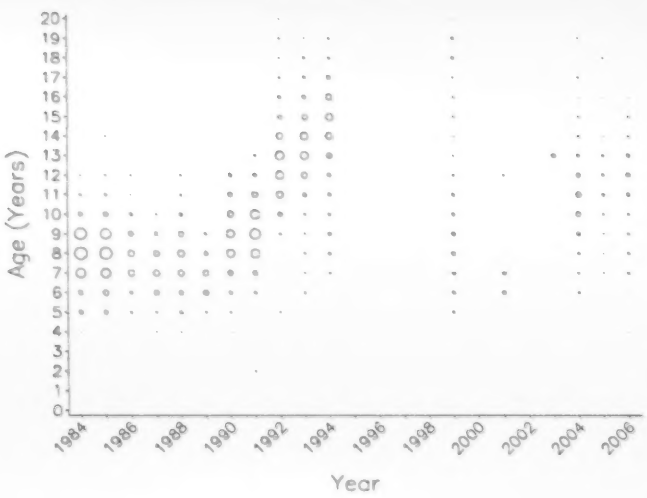


Figure 1.6. Bubble plot of the Lake Trout age distribution in the commercial harvest for management unit 1-3. Relative size of bubble represents the proportion of fish at that age.

Management Unit 4

RECOMMENDATIONS

- **Stocking not required.**
- Maintain regular independent assessment to monitor stock status as availability of commercial data is declining.
- If native Lake Trout decline such that they are < 50% of the commercial harvest and the mean age of native fish in the harvest is <8 years, ensure this finding is communicated to the Lake Manager.
- If rehabilitative stocking is directed, stock off shore using Slate Island strain yearlings at a rate commensurate with current stock status

Zones 4 Area: (ha)	
>50 fa	0
<50 fa	13,871
Total	13,871

Stocking Direction 1992-2006

- Continue to stock at 2.3 yearlings per ha. (31,903) using Michipicoten strain.

Table 4.1. Recommended stocking rate, number stocked and actual stocking rate from 1992 to 2006.

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Recommended stocking rate[1]	N/A	2.30	2.30	2.30	2.30	2.30	2.30	2.30	-	-	-	-	-	-	-
Actual # stocked	170573	36948	33986	32000	31968	32002	21665	19700	0	0	18535	0	0	0	0
Actual stocking rate	12.30	2.66	2.45	2.31	2.30	2.31	1.56	1.42	-	-	1.34	-	-	-	-

[1]Stocking rate units are number/ha

Actions to date

- Stocking continued until 1999 as native Lake Trout were <50% of the commercial harvest and mean age was <8 years.
- Stocking in 2000 and 2001 did not occur.
- Assessment of Lake Trout stocks occurred in 1986, 2000 and 2006.

Stock Status

- Mean age in the commercial harvest >8 years at last review in 1996 (Figure 4.3).
- Fish in commercial and index catch >50% wild (Figure 4.4).
- Age in the commercial harvest is between 5 years and 16 years but trending older (Figure 4.6).

Risk

- Exploitation risk is low as recent commercial harvests are well below the 0.25 kg/ha harvest guideline (Figure 4.1).
- May have to rely on index data if commercial harvest remains low.
- Whitefish harvest is below the recommended harvest guideline, which if exceeded could result in excessive trout bycatch (Figure 4.2).
- Lack of commercial sampling of First Nation (FN) commercial harvest limits assessment capabilities.
- Angler harvest is small.

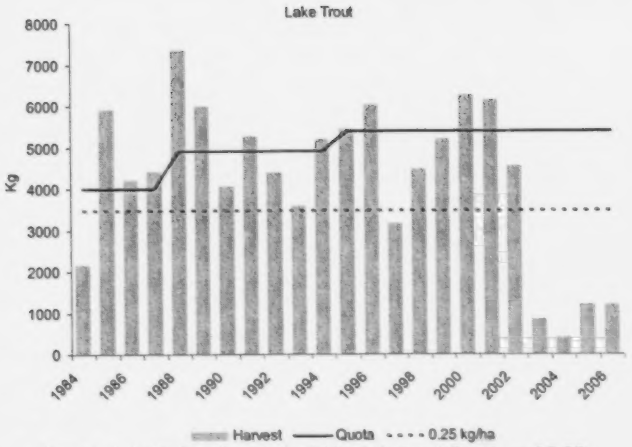


Figure 4.1. Lake Trout quota (solid line), harvest (bars), and 0.25 kg/ha harvest guideline (dashed line) for management unit 4.

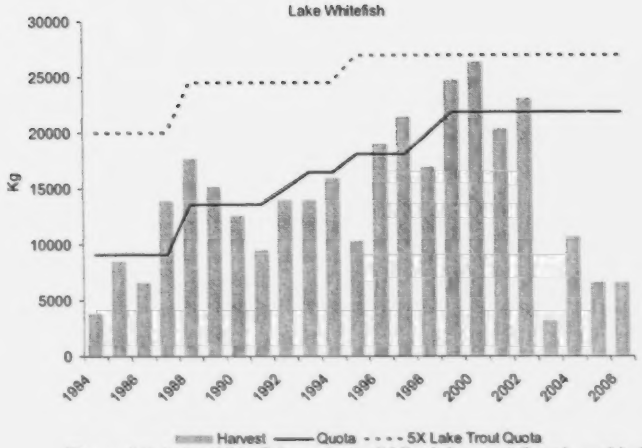


Figure 4.2. Lake Whitefish quota (solid line), harvest (bars), and Lake Whitefish harvest guideline (dashed line) for management unit 4.

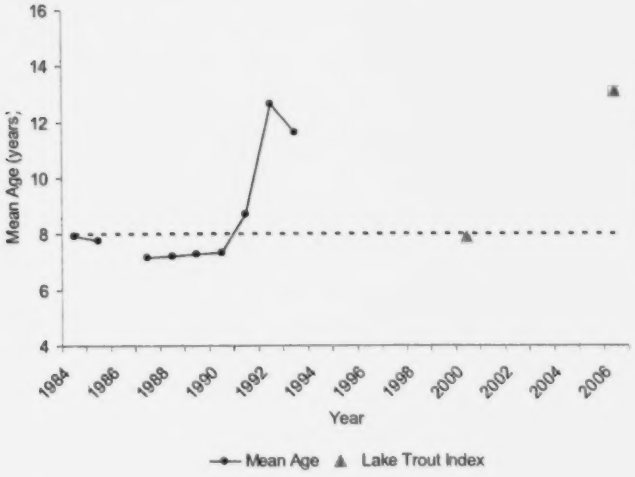


Figure 4.3. Lake Trout mean age (solid line) in the commercial harvest and Lake Trout index (triangle symbols) for management unit 4. Dashed line indicates a mean age of 8.

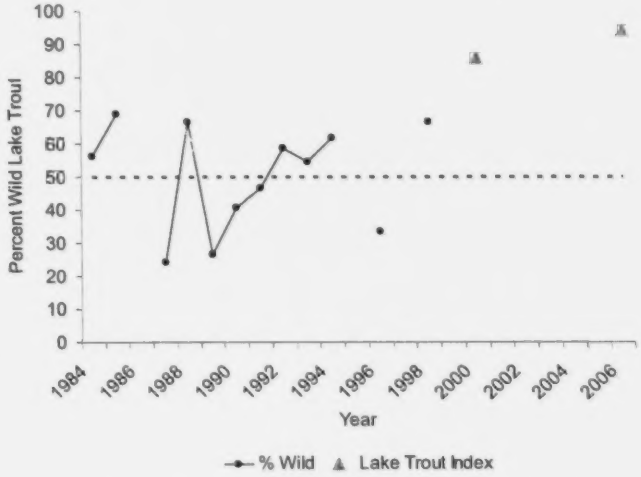


Figure 4.4. Percentage of wild Lake Trout (solid line) in the commercial harvest and Lake Trout index (triangle symbols) for management unit 4. Dashed line indicates 50% wild Lake Trout.

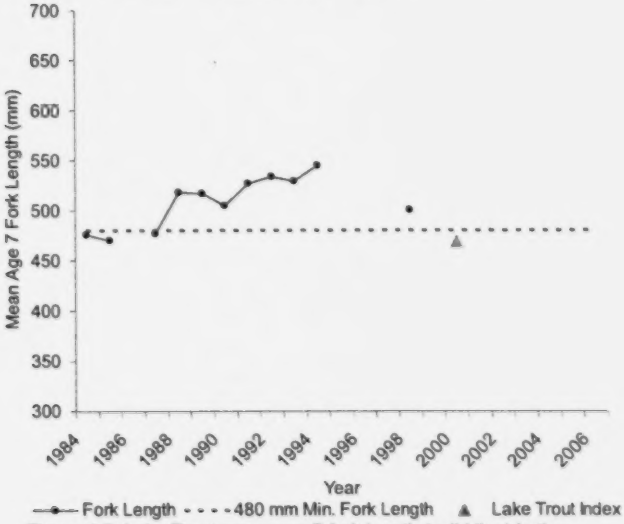


Figure 4.5. Lake Trout mean age 7 fork length (solid line) in the commercial catch and Lake Trout index (triangle symbol) for management unit 4. Dashed line indicates a 480 mm fork length.

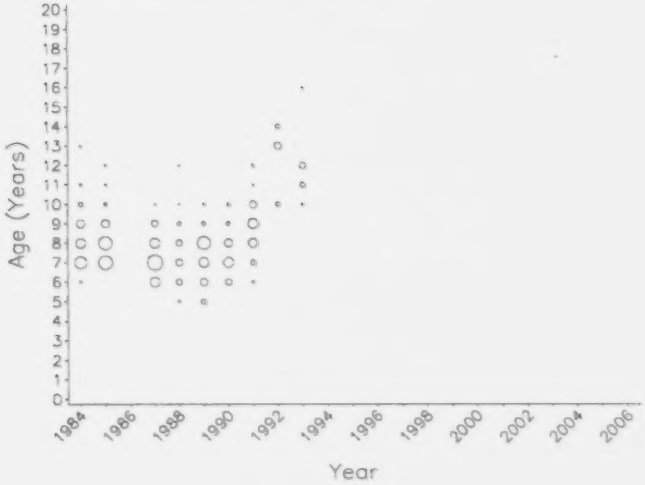


Figure 4.6. Bubble plot of the Lake Trout age distribution in the commercial harvest for management unit 4. Relative size of bubble represents the proportion of fish at that age.

Management Unit 5

RECOMMENDATIONS

- **Stocking not required.**
- Maintain regular independent assessment to monitor stock status as annual commercial data is variable.
- If native Lake Trout decline such that they are <50% of the commercial harvest and the mean age of native fish is <8 years, ensure this finding is communicated to the Lake Manager.
- If rehabilitative stocking is directed, stock off shore using Slate Island strain yearlings at a rate commensurate with current stock status.

Zone 5 Area: (ha)	
>50 fa	16,253
<50 fa	25,361
Total	41,614

Stocking Direction 1992-2006

- Stocking not required as native Lake Trout are greater than 50% of the harvest and risk is low despite not knowing if mean age is greater than 8 years.

Table 5.1. Recommended stocking rate, number stocked, and actual stocking rate from 1992 to 2006.

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Recommended stocking rate[1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Actual # stocked	129427	0	0	0	0	0	170000	0	0	0	0	0	0	0	0	0
Actual stocking rate	5.10	-	-	-	-	-	6.7	-	-	-	-	-	-	-	-	-

[1]Stocking rate units are number/ha

Action to Date

- Stocking ceased after 1992.
- In the fall of 1998, 170,000 twelve month old fish were stocked in this zone (Table 5.1). It is presumed they were surplus to the planned stocking in 1999 as they had the 1999 fin clip.
- Stock assessment occurred in 2000 and 2006.

Stock Status

- Trout in commercial and index catch >50% wild (Figure 5.4).
- Mean age in the commercial harvest >8 years between 1990 and 1995 (Figure 5.3).
- Age in the commercial harvest was between 7 years and 18 years in 1994 and may be trending older (Figure 5.6).

Risk

- Exploitation risk is low as recent commercial harvests are well below the 0.25 kg/ha harvest guideline (Figure 5.1),
- Commercial harvest data is not available from 1995 to present (Figure 5.3).
- Whitefish harvest is below recommended 0.25 kg/ha harvest guideline, which if exceeded could result in excessive Lake Trout bycatch (Figure 5.2).
- Angler harvest is small.

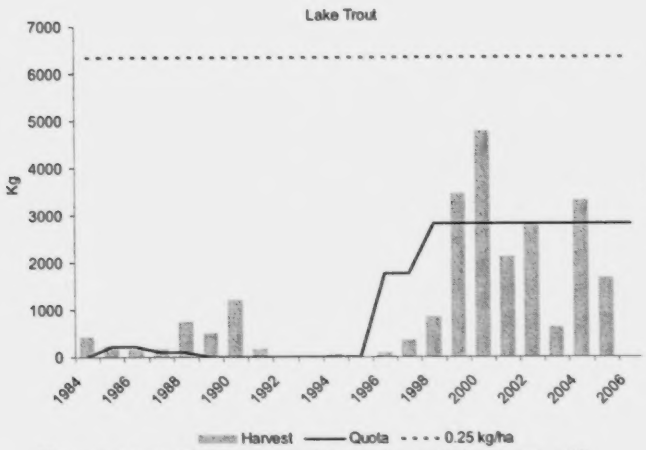


Figure 5.1. Lake Trout quota (solid line), harvest (bars), and 0.25 kg/ha harvest guideline (dashed line) for management unit 5.

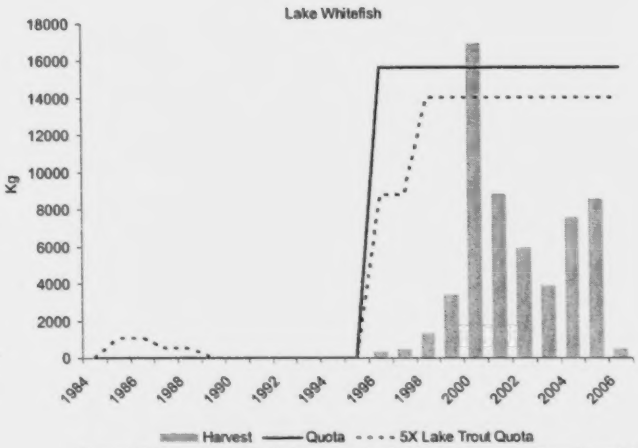


Figure 5.2. Lake Whitefish quota (solid line), harvest (bars), and Lake Whitefish harvest guideline (dashed line) for management unit 5.

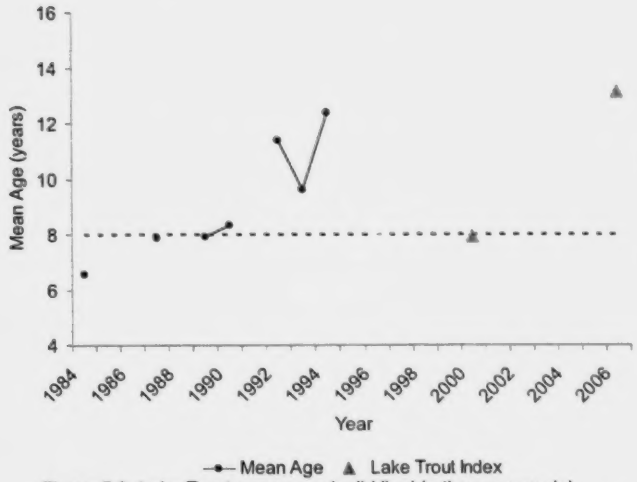


Figure 5.3. Lake Trout mean age (solid line) in the commercial harvest and Lake Trout index (triangle symbol) for management unit 5. Dashed line indicates a mean age of 8.

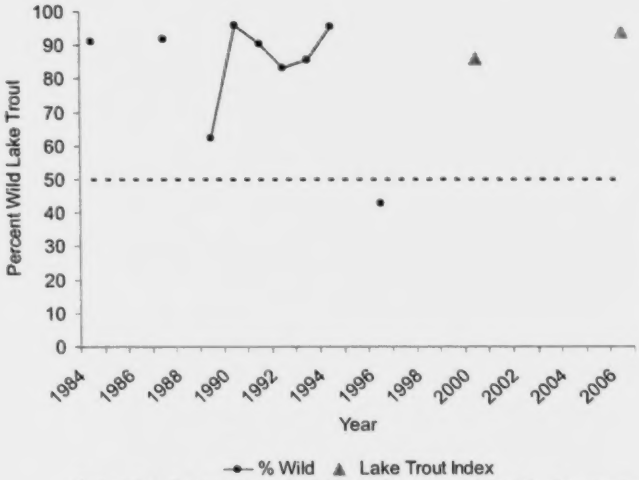


Figure 5.4. Percentage of wild Lake Trout (solid line) in the commercial harvest and Lake Trout index (triangle symbol) for management unit 5. Dashed line indicates 50% wild Lake Trout.

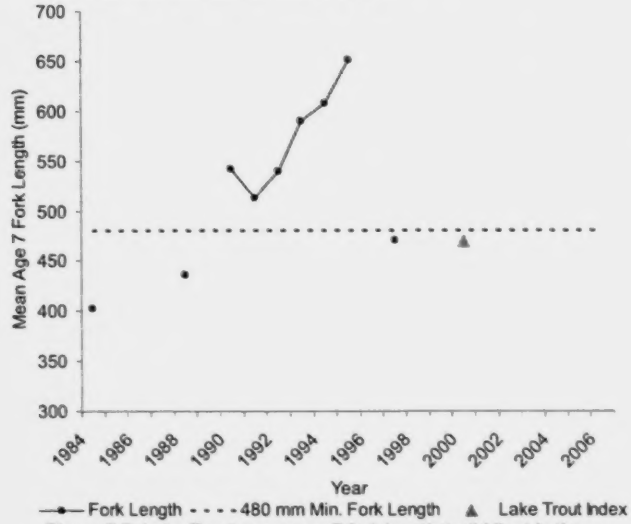


Figure 5.5. Lake Trout mean age 7 fork length (solid line) in the commercial harvest and Lake Trout index (triangle symbol) for management unit 5. Dashed line indicates a 480 mm fork length.

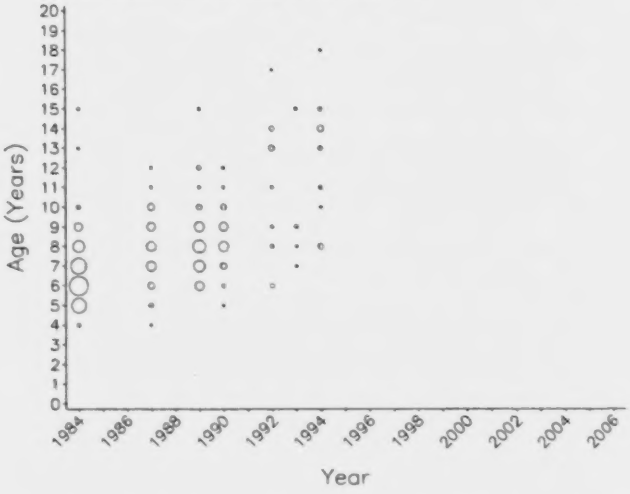
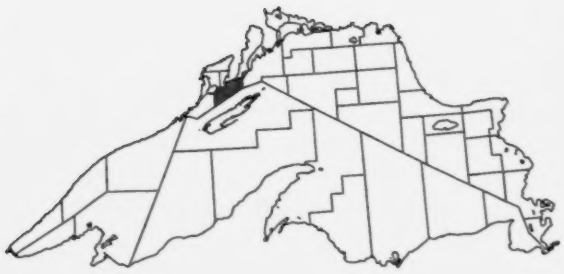


Figure 5.6. Bubble plot of the Lake Trout age distribution in the commercial harvest for management unit 5. Relative size of bubble represents the proportion of fish at that age.

Management Unit 6



RECOMMENDATIONS

- **Stocking not required.**
- Initiate regular independent assessment to monitor stock status as annual commercial data is variable.
- If native Lake Trout decline such that they are <50% of the commercial harvest and mean age of native fish is < 8 years, ensure this finding is communicated to Lake Manager.
- If rehabilitative stocking is directed, stock off shore using Slate Island strain yearlings at a rate commensurate with current stock status.

Zone 6 Area: (ha)	
>50 fa	40,410
<50 fa	5,875
Total	46,285

Stocking Direction 1992-2006

- Stocking not required as native Lake Trout are greater than 50% of the harvest and mean age is greater than 8 years.

Table 6.1. Recommended stocking rate, number stocked, and actual stocking rate from 1992 to 2006.

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Recommended stocking rate[1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Actual # stocked	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Actual stocking rate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

[1]Stocking rate units are number/ha

Actions to date

- No stocking has occurred.
- No independent Lake Trout assessment has occurred.
- The commercial fishery is active, but catch sampling opportunities are limited.

Stock Status

- Mean age in the commercial harvest >8 years at last review in 1996 (Figure 6.3).
- Fish in commercial harvest and index catch >50% wild (Figure 6.4).
- Mean length for age 7 fish is above the 480 mm benchmark (Figure 6.5).
- Age in the present commercial harvest is unknown (Figure 6.6).

Risk

- Exploitation risk is low as recent commercial harvests are below the 0.25 kg/ha harvest guideline (Figure 6.1).
- Whitefish harvest is well below recommended 0.25 kg/ha harvest guideline, which if exceeded could result in excessive Lake Trout bycatch (Figure 6.2).
- Most fish examined are wild, (Figure 6.4)
- Stock status data from commercial fishery is sporadic and not supported by index data during the report period (1993-2006).
- Since 2002, harvest of Lake Trout and whitefish is well below quota suggesting little effort or few trout to provide commercial stock status data (e.g. mean age - Figure 6.3 and age distribution - Figure 6.6)
- Angler harvest is small.

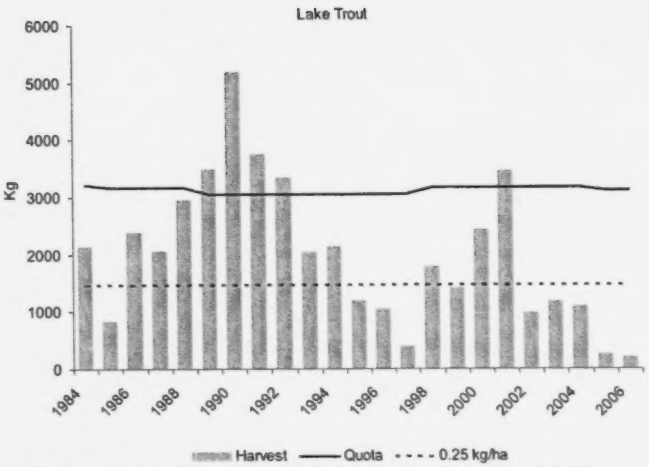


Figure 6.1. Lake Trout quota (solid line), harvest (bars), and 0.25 kg/ha harvest guideline (dashed line) for management unit 6.

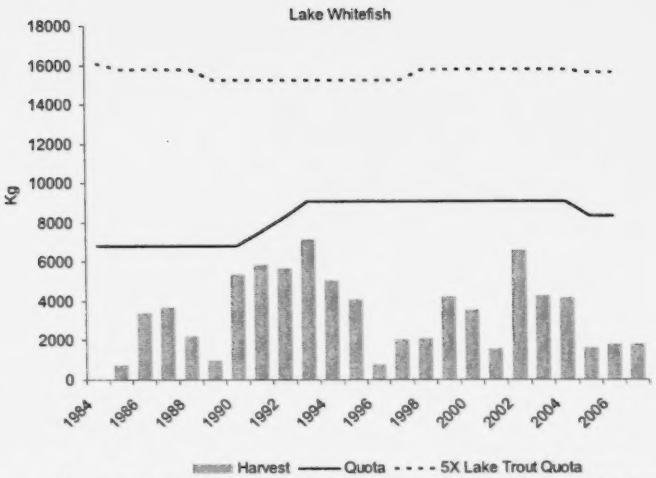


Figure 6.2. Lake Whitefish quota (solid line), harvest (bars), and Lake Whitefish harvest guideline (dashed line) for management unit 6.

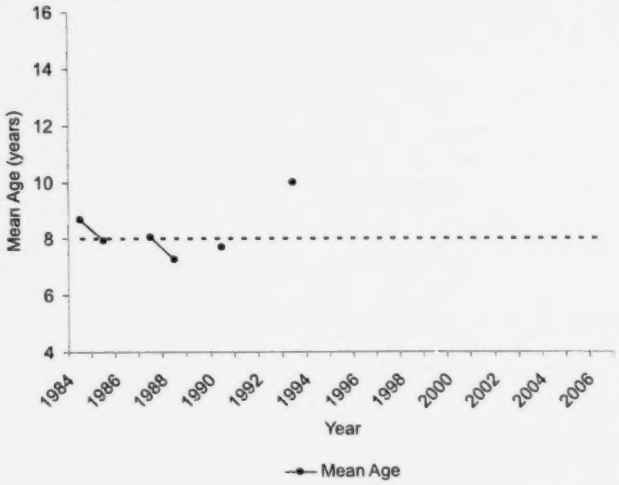


Figure 6.3. Lake Trout mean age (solid line) in the commercial harvest and. Dashed line indicates a mean age of 8.

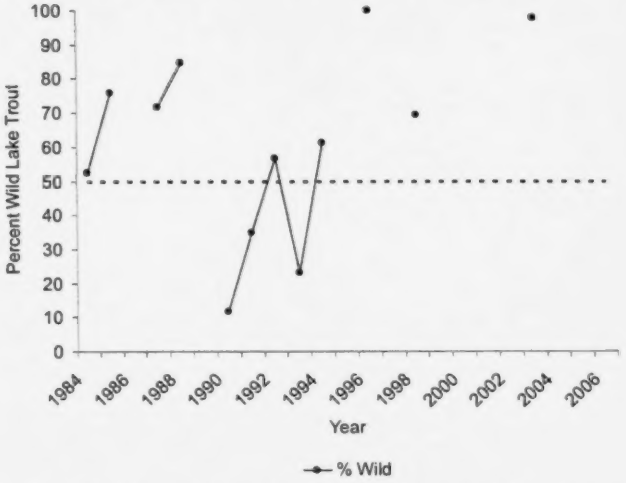


Figure 6.4. Percentage of wild Lake Trout (solid line) in the commercial harvest for management unit 6. Dashed line indicates 50% wild Lake Trout.

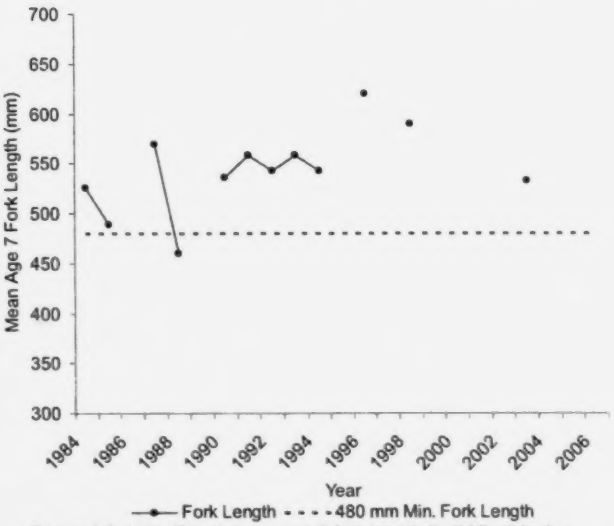


Figure 6.5. Lake Trout mean age 7 fork length (solid line) in the commercial harvest for management unit 6. Dashed line indicates a 480 mm fork length.

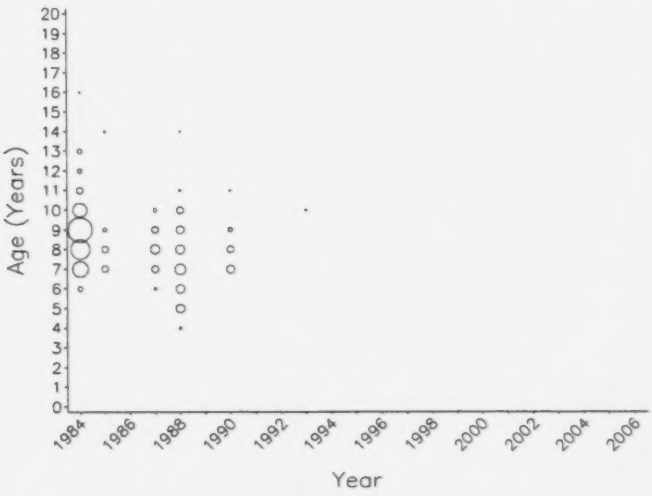


Figure 6.6. Bubble plot of the Lake Trout age distribution in the commercial harvest for management unit 6. Relative size of bubble represents the proportion of fish at that age.

Management Unit 7

RECOMMENDATIONS

- **Stocking not recommended.**
- Monitor commercial bycatch as an indicator of abundance.
- Initiate regular index assessment to monitor stock status, as commercial catch sampling is limited.
- If native Lake Trout decline such that they are <50% of the commercial harvest and mean age of native fish is < 8 years, ensure this finding is communicated to the Lake Manager.
- Reassessment of Lake Trout habitat abundance is required to support discussion on the necessity of rehabilitative stocking in the future.
- If rehabilitative stocking is directed, stock off shore using Slate Island strain yearlings at a rate commensurate with current stock status.

Zone 7 Area: (ha)	
>50 fa	0
<50 fa	60,139
Total	60,139

Stocking Direction 1992-2006

- Defer stocking in recognition of necessity to manage the collapsed cisco stocks when Lake Trout by-catch may be high.[3]
- Benchmarks for rehabilitated Lake Trout stock were not present in 1991, but it was felt that MU 9 stocking may be contributing to presence of hatchery fish in this MU.

Table 7.1. Recommended stocking rate, number stocked, and actual stocking rate from 1992 to 2006.

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Recommended stocking rate[1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Actual # stocked	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Actual stocking rate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

[1]Stocking rate units are number/ha

Action to date

- Stocking ceased in 1987.
- No index assessment has been undertaken.

Stock Status

- Mean age in the limited commercial harvest record is <8 years for most data points (Figure 7.3).
- Most data points in limited commercial harvest record show Lake Trout are >50% wild (Figure 7.4).
- Mean fork length of age 7 fish have reached the 480 mm benchmark (Figure 7.5).
- Aging is not done every year; most age classes are represented in 2006 catch sample (Figure 7.6).

Risk

- Exploitation risk is low as recent commercial harvests are below the 0.25 kg/ha harvest guideline (Figure 7.1) and angler harvest is small.
- Whitefish harvest is well below recommended 0.25 kg/ha harvest guideline, which if exceeded could result in excessive Lake Trout bycatch (Figure 7.2).
- Most fish are wild, however in recent years harvest is below quota suggesting little effort or few trout.
- Commercial catch sampling and aging data is limited.

[3] This is no longer a concern since the herring fishery has gone from a bottom set fishery to a roe fishery using floating sets. The Lake Trout bycatch in the roe fishery is almost non-existent.

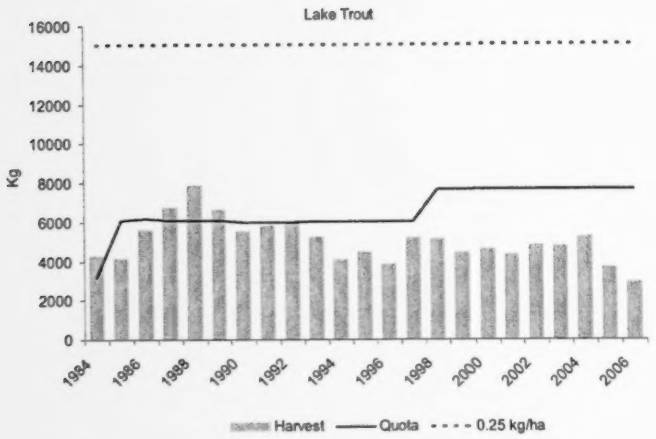


Figure 7.1. Lake Trout quota (solid line), harvest (bars), and 0.25 kg/ha harvest guideline (dashed line) for management unit 7.

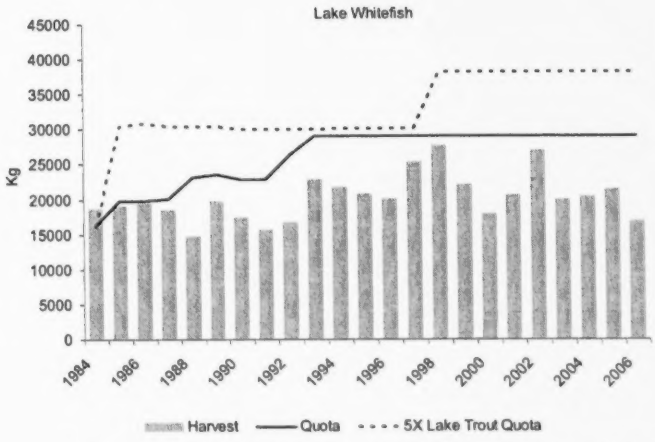


Figure 7.2. Lake Whitefish quota (solid line), harvest (bars), and Lake Whitefish harvest guideline (dashed line) for management unit 7.

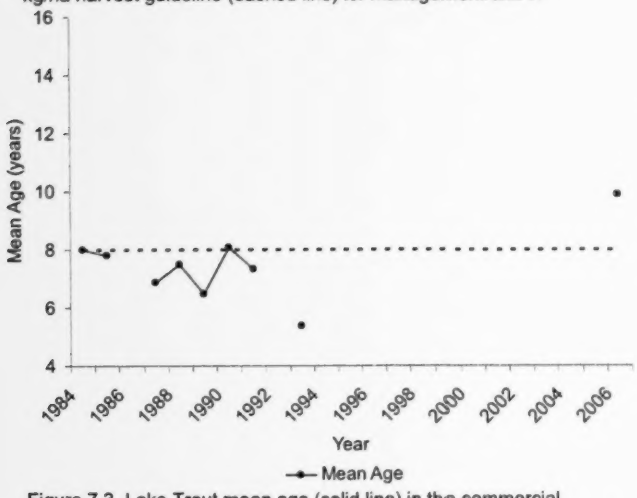


Figure 7.3. Lake Trout mean age (solid line) in the commercial harvest for management unit 7. Dashed line indicates a mean age of 8.

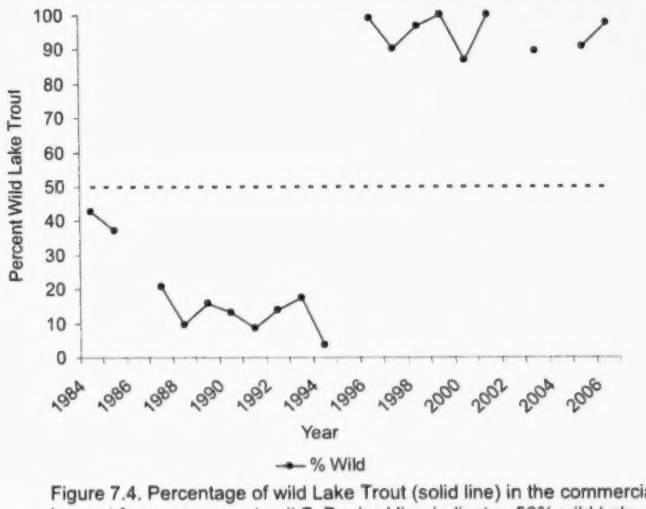


Figure 7.4. Percentage of wild Lake Trout (solid line) in the commercial harvest for management unit 7. Dashed line indicates 50% wild Lake Trout.

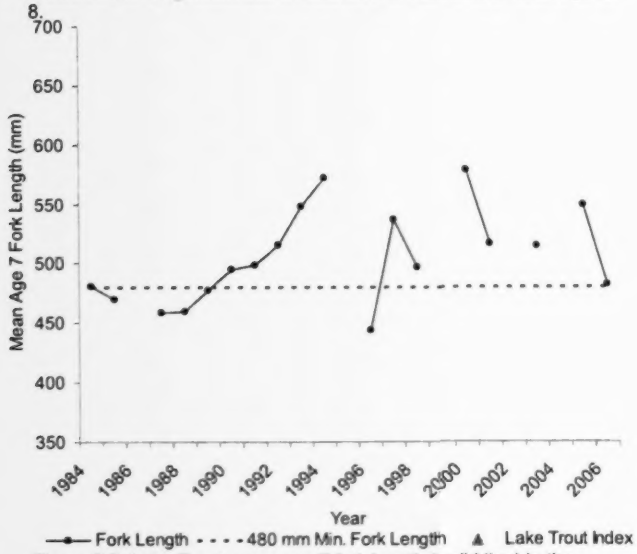


Figure 7.5. Lake Trout mean age 7 fork length (solid line) in the commercial harvest for management unit 7. Dashed line indicates a 480 mm fork length.

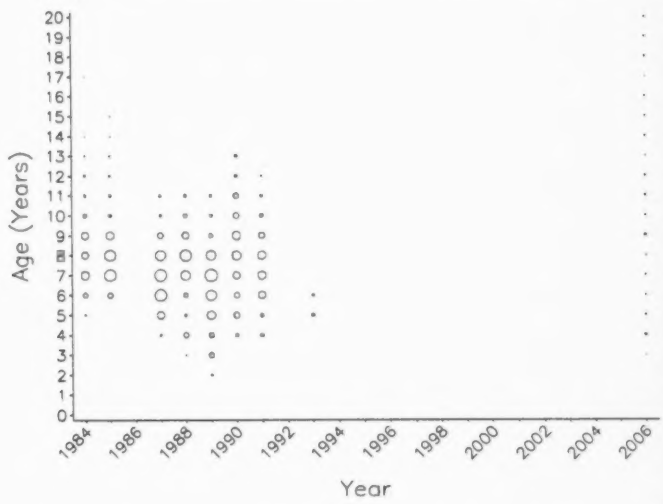
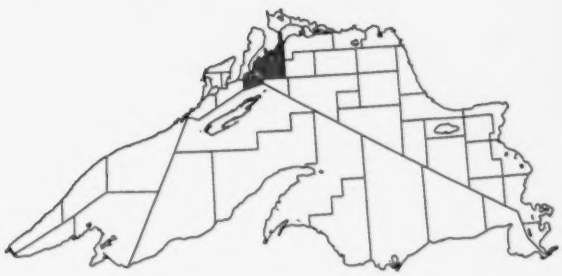


Figure 7.6. Bubble plot of the Lake Trout age distribution in the commercial harvest for management unit 7. Relative size of bubble represents the proportion of fish at that age.

Management Unit 9



Zone 9 Area: (ha)	
>50 fa	72,432
<50 fa	28,759
Total	101,191

RECOMMENDATIONS

- **Stocking is not recommended.**
- Maintain regular index assessment to monitor stock status.
- If native Lake Trout decline such that they are < 50% of the commercial harvest and mean age of native fish is < 8 years, ensure this finding is communicated to the Lake Manager.
- If rehabilitative stocking is directed, stock off shore using Slate Island strain yearlings at a rate commensurate with current stock status.

Stocking Direction 1992-2006

- The percent native fish in the harvest is <the 50% benchmark and the mean age of native fish <8 years.
- Stock Slate Island strain at 3.5 yearlings per ha. (100,656) until 1997.

Table 9.1. Recommended stocking rate, number stocked, and actual stocking rate from 1992 to 2006.

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Recommended stocking rate[1]		3.50	3.50	3.50	3.50	3.50	2.30	2.30	2.30	2.30	2.30				
Actual # stocked	170573	100000	103362	102652	72308	91085	259282	0	101825	0	73911	0	0	0	0
Actual stocking rate	0.00	3.48	3.60	3.48	2.51	3.17	9.02	-	3.54	-	2.57	-	-	-	-

[1]Stocking rate units are number/ha

Action to Date

- Stocking ceased in 2003.
- Lake Trout index assessment occurred in 2000.
- Despite trout harvests >4000 kg/yr until 2006, commercial catch sampling has been limited.

Stock Status

- Mean age in the limited commercial catch sampling record is >8 years for data points since 1991(Figure 9.3).
- Trout in the limited commercial catch sampling record are >50% wild since 1997 (Figure 9.4).
- Mean fork lengths of age 7 fish have exceeded the 480 mm benchmark (Figure 9.5).
- Age classes are equally represented in 2006 commercial harvest record, but numbers are small (Figure 9.6).

Risk

- Exploitation risk is low as recent commercial harvests are below the 0.25 kg/ha harvest guideline (Figure 9.1) and angler harvest is small.
- Whitefish harvest is well below recommended 0.25 kg/ha harvest guideline, which if exceeded could result in excessive Lake Trout bycatch (Figure 9.2).
- Most fish are wild, however in recent years harvest is below quota suggesting reduced effort for both Lake Trout and whitefish (Figures 9.1 and 9.4).
- Limited commercial catch sampling data to support a description of Lake Trout status.

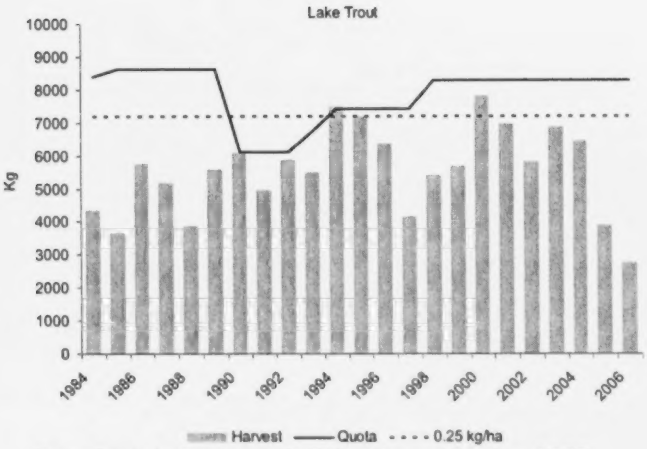


Figure 9.1. Lake Trout quota (solid line), harvest (bars), and 0.25 kg/ha harvest guideline (dashed line) for management unit 9.

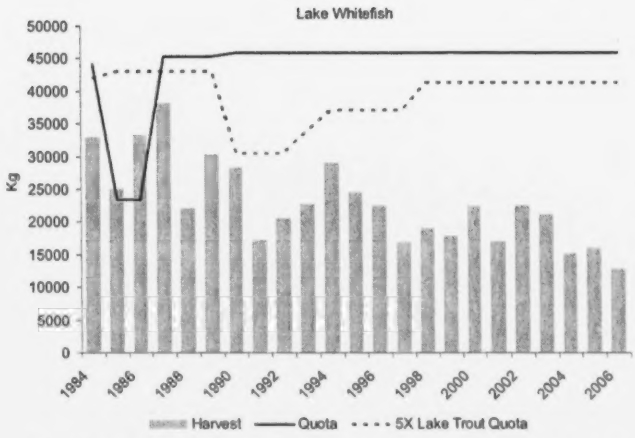


Figure 9.2. Lake Whitefish quota (solid line), harvest (bars), and Lake Whitefish harvest guideline (dashed line) for management unit 9.

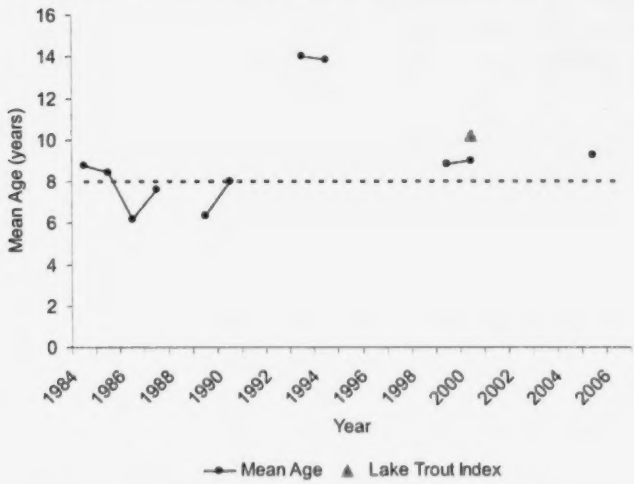


Figure 9.3. Lake Trout mean age (solid line) in the commercial harvest and Lake Trout index (triangle symbol) for management unit 9. Dashed line indicates a mean age of 8

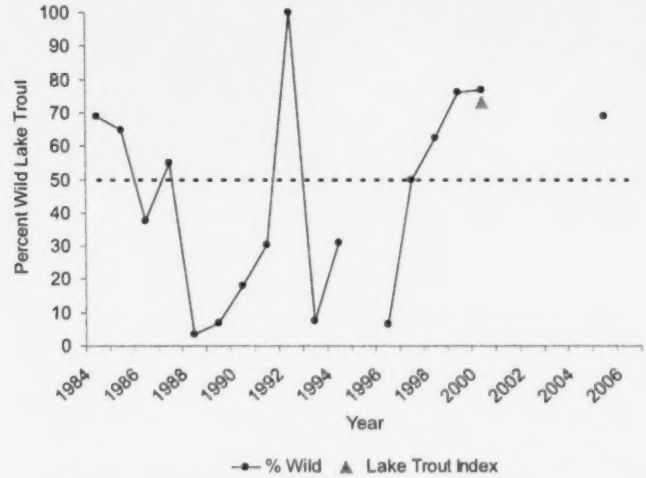


Figure 9.4. Percentage of wild Lake Trout (solid line) in the commercial harvest and Lake Trout index (triangle symbol) for management unit 9. Dashed line indicates 50% wild Lake Trout.

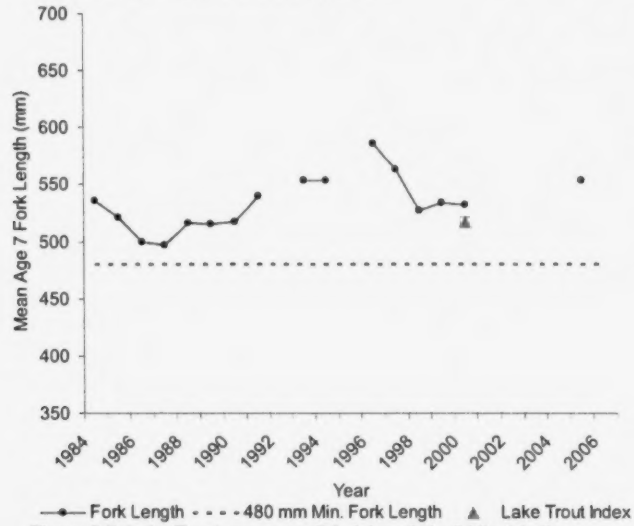


Figure 9.5. Lake Trout mean age 7 fork length (solid line) in the commercial harvest and Lake Trout index (triangle symbol) for management unit 9. Dashed line indicates a 480 mm fork length.

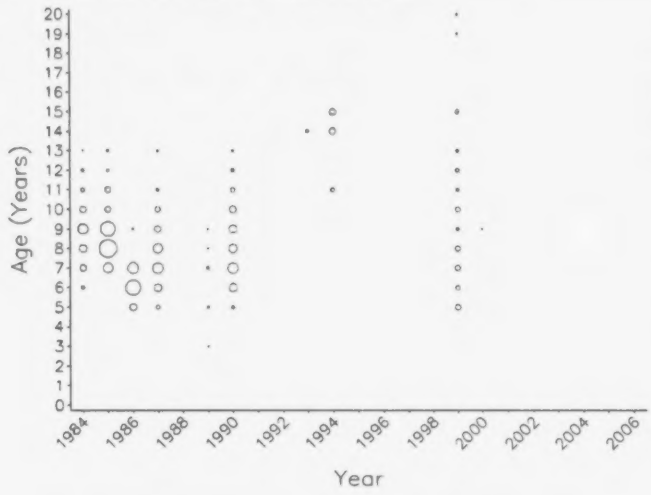


Figure 9.6. Bubble plot of the Lake Trout age distribution in the commercial harvest for management unit 9. Relative size of bubble represents the proportion of fish at that age.

Management Unit 10

Zone 10 Area: (ha)	
>50 fa	0
<50 fa	39,818
Total	39,818

RECOMMENDATIONS

- **Stock the fish currently in the Fish Culture system.**
- **Do not stock after 2012.**
- Maintain regular index assessment to monitor stock status.
- Monitor angler creels for Lake Trout harvest, and bio data.
- Monitor lamprey wounding rates (target <5/100 fish).
- If native Lake Trout decline such that they are <50% of the index survey catch and mean age of native fish is <8 years, ensure this finding is communicated to the Lake Manager.
- If rehabilitative stocking is directed to continue, stock off shore over suitable habitat using Slate Island strain yearlings at a rate commensurate with current stock status.

Stocking Direction 1992-2006

- Stocking discontinued in 1991 due to low risk of exploitation[4] at the time, despite lack of stock status information.

Table 10.1. Recommended stocking rate, number stocked, and actual stocking rate from 1992 to 2006.

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Recommended stocking rate[1]												3.5	3.5	3.5	3.5
Actual # stocked	75346	0	0	0	0	0	0	0	28666	0	0	126489	80973	189892	181292
Actual stocking rate	0.73	0	0	0	0	0	0	0	0.72	0	0	3.18	2.03	4.77	4.55

[1]Stocking rate units are number/ha

Actions to date

- Stocking was discontinued between 1993 and 2003.
- Stocking was reinstated in 2003 at the request of the Lake Superior Advisory Committee which expressed concern over reports by local anglers that most Lake Trout had lamprey wounds.
- Stocking consisted of shore and open water stocking dependent upon the weather, staff availability and stocking budget.
- Assessment of Lake Trout stocks occurred in 2000.

Stock Status

- Most fish in the 2000 index assessment were wild since no stocking occurred between 1993 and 1999 (Figure 10.3).
- Mean fork length of age 7 fish at or above the 480 mm benchmark is unknown (Figure 10.4).
- Age class representation unknown due to no commercial fishing activity permitted.

Risk

- No recent stock status data including lamprey wounding rates.
- Exploitation risk is low as there has been no commercial fishery (Figure 10.1 and 10.2), however angler harvest has not been assessed.
- Sea Lamprey predation was noted as high in 2001 (LSTC 2003).
- Sea Lamprey larvicide treatment of Helen and Polly Lakes in the Nipigon River system is problematic.

[4] The low risk was due to no commercial fishing

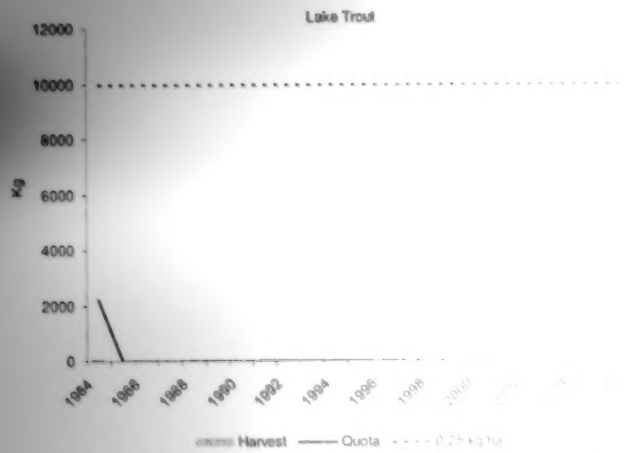


Figure 10.1. Lake Trout quota (solid line), harvest (bars), and 0.25 kg/ha harvest guideline (dashed line) for management unit 10.

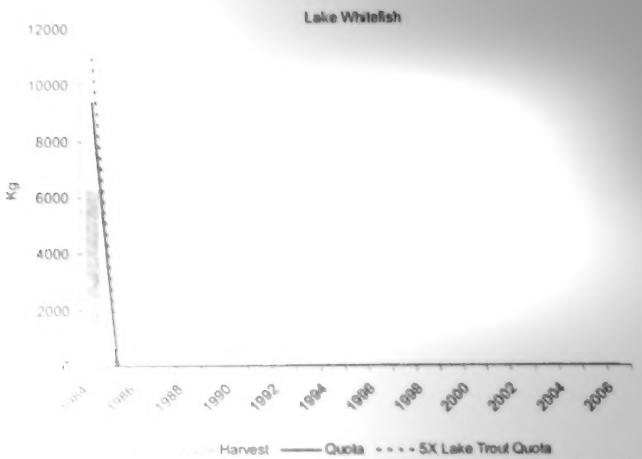


Figure 10.2. Lake Whitefish quota (solid line), harvest (bars), and Lake Whitefish harvest guideline (dashed line) for management unit 10.

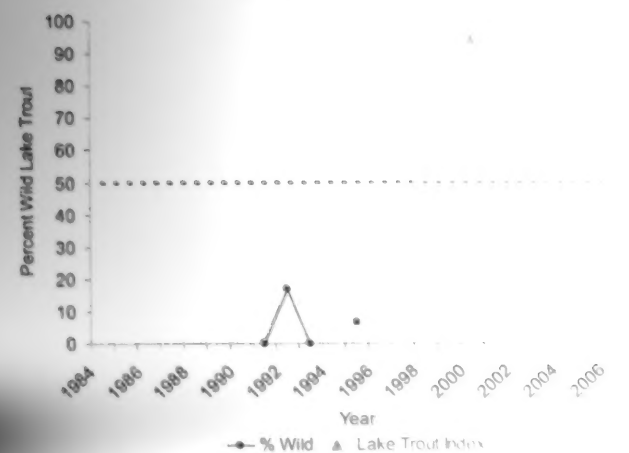


Figure 10.3. Percentage of wild Lake Trout (solid line) in the commercial harvest and Lake Trout index (triangle symbol) for management unit 10. Dashed line indicates 50% wild Lake Trout.

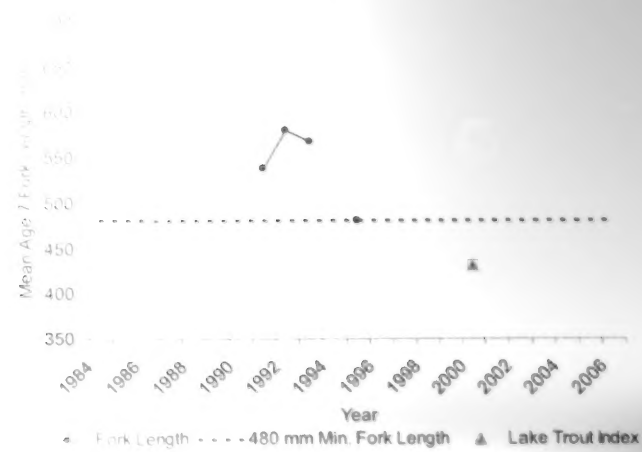
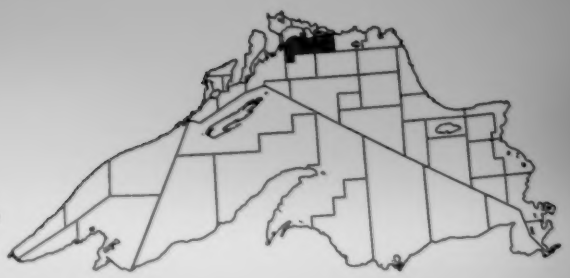


Figure 10.4. Lake Trout mean age 7 fork length (solid line) in the commercial harvest and Lake Trout index (triangle symbol) for management unit 10. Dashed line indicates a 480 mm fork length.

Management Unit 12



Zone 12 Area: (ha)	
>50 fa	91,066
<50 fa	14,218
Total	105,284

RECOMMENDATIONS

- **Stocking is not recommended.**
- Maintain regular index assessment to monitor stock status. If native Lake Trout decline such that they are <50% of the index survey catch and mean age of native fish is <8 years, ensure this finding is communicated to the Lake Manager.
- Under a declining stock status condition do not reinstate stocking if unregulated exploitation is occurring or if lamprey wounding rates remain high.
- Stocking of this MU is problematic due to its remoteness and the expense of doing so. If stocking is directed consider **pulse stocking** using Slate Island strain yearlings at offshore locations every 2 to 3 years.

Stocking Direction 1992-2006

- Stocking was not required due to remote location and low risk of exploitation at the time.

Table 12.1. Recommended stocking rate, number stocked, and actual stocking rate from 1992 to 2006.

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Recommended stocking rate[1]															
Actual # stocked	210981	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Actual stocking rate	14.46	-	-	-	-	-	-	-	-	-	-	-	-	-	-

[1]Stocking rate units are number/ha

Action to date

- No stocking has occurred.
- Assessment of Lake Trout stocks occurred in 2001.
- Commercial catch sampling has not occurred since 1995.

Stock Status

- Mean age in the commercial harvest since 1995 is not known (Figure 12.3.)
- Mean age in the 2001 index assessment was >8 (Figure 12.3) and fish were >50% wild (Figure12.4).
- Mean fork length of age 7 commercially caught fish relative to the 480 mm benchmark is unknown since 1995 (Figure 12.5).
- Annual age class representation since 1994 is unknown (Figure 12.6).

Risk

- Recent commercial stock status data and lamprey wounding rates are not available.
- Exploitation risk is low as recent commercial harvests are well below the TACC and the 0.25 kg/ha harvest guideline (Figure 12.1).
- Whitefish harvest is well below the TACC and recommended 0.25 kg/ha harvest guideline, which if exceeded could result in excessive Lake Trout bycatch (Figure 12.2).
- Angler harvest risk is unknown.
- Proximity to MU 10 may increase Sea Lamprey predation risk.

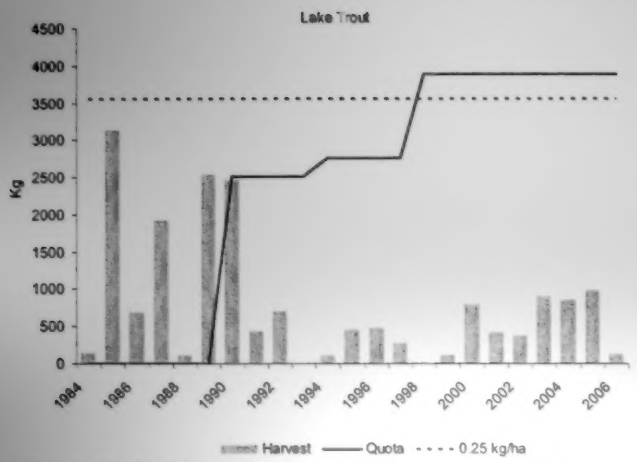


Figure 12.1. Lake Trout quota (solid line), harvest (bars), and 0.25 kg/ha harvest guideline (dashed line) for management unit 12.

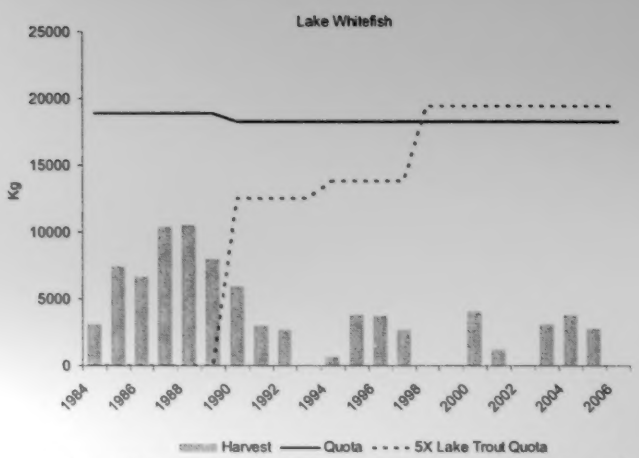


Figure 12.2. Lake Whitefish quota (solid line), harvest (bars), and Lake Whitefish harvest guideline (dashed line) for management unit 12.

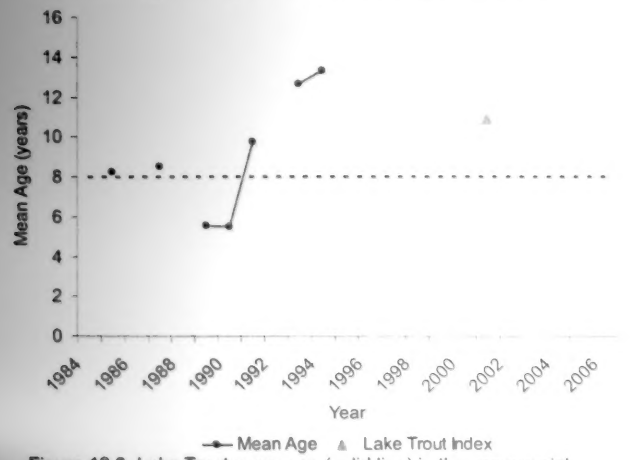


Figure 12.3. Lake Trout mean age (solid line) in the commercial harvest and Lake Trout index (triangle symbol) for management unit 12. Dashed line indicates a mean age of 8

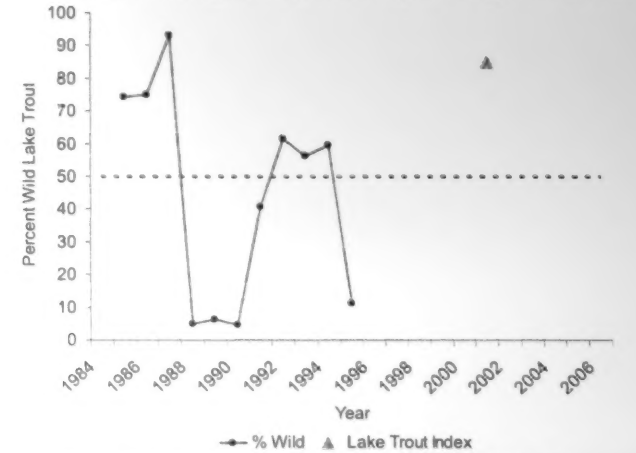


Figure 12.4. Percentage of wild Lake Trout (solid line) in the commercial harvest and Lake Trout index (triangle symbol) for management unit 12. Dashed line indicates 50% wild Lake Trout.

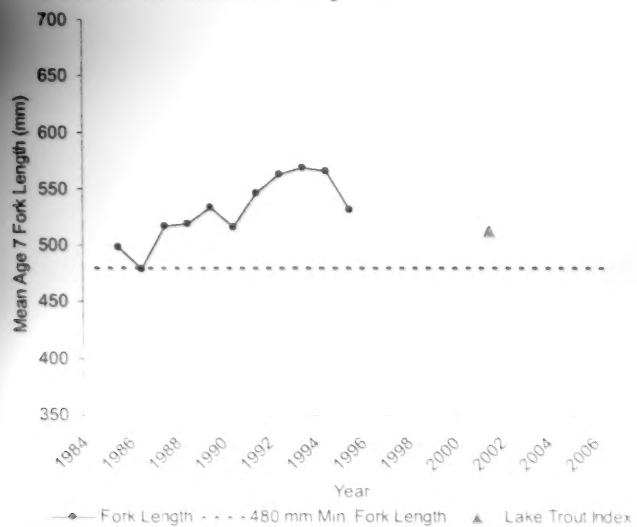


Figure 12.5. Lake Trout mean age 7 fork length (solid line) in the commercial harvest and Lake Trout index (triangle symbol) for management unit 12. Dashed line indicates a 480 mm fork length.

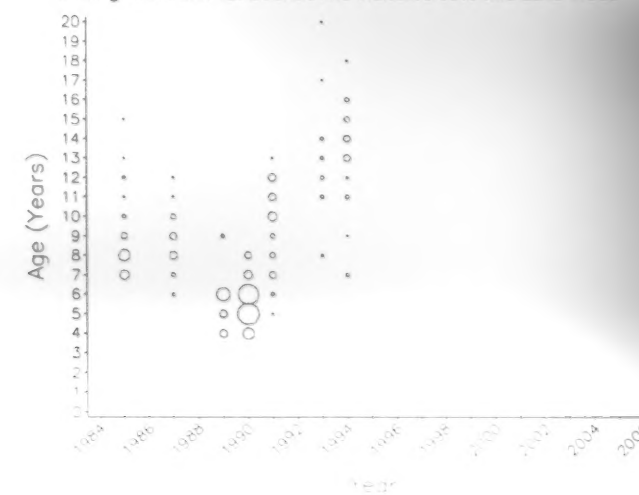


Figure 12.6. Bubble plot of the Lake Trout age distribution in the commercial harvest for management unit 12. Relative size of bubble represents the proportion of fish at that age.

Management Unit 18

RECOMMENDATIONS

- **Stocking is not recommended.**
- Maintain regular index assessment to monitor stock status.
  If native Lake Trout decline such that they are <50% of the index survey catch and mean age of native fish is <8 years, ensure this finding is communicated to the Lake Manager.
- Stocking of this MU is problematic due to its remoteness and the expense of doing so. If stocking is directed consider **pulse stocking** using Slate Island strain yearlings at offshore locations every 2 to 3 years.

Zone 18 Area: (ha)	
>50 fa	50,087
<50 fa	17,485
Total	68,087

Stocking Direction 1992-2006

- Stocking was not required due to remote location and low risk of exploitation at the time.

Table 18.1. Recommended stocking rate, number stocked, and actual stocking rate from 1992 to 2006.

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Recommended stocking rate[1]															
Actual # stocked	70851	60933	0	0	0	0	0	0	0	0	0	0	0	0	0
Actual stocking rate	6.28	3.48	-	-	-	-	-	-	-	-	-	-	-	-	-

[1]Stocking rate units are number/ha

Action to date

- No stocking has occurred since 1993.
- Assessment of Lake Trout stocks occurred in 2001.
- Commercial harvest is very small and commercial catch sampling has not occurred since 1998.

Stock Status

- Mean age in the commercial harvest since 1995 is not known (Figure 18.3).
- Trout in the 2001 index assessment were >50% wild (Figure 18.4) and mean age was >8 (Figure 18.3).
- Mean fork length of age 7 fish relative to the 480 mm benchmark achieved prior to 1995 but is unknown since (Figure 18.5). The 2001 index mean fork length did not achieve the 480 mm.
- Age classes representation since 1994 unknown (Figure 18.6).

Risk

- Recent commercial stock status data and lamprey wounding rates are not available.
- Exploitation risk is low as recent commercial harvests are well below the TACC and the 0.25 kg/ha harvest guideline (Figure 18.1).
- Whitefish harvest is well below the TACC and recommended 0.25 kg/ha harvest guideline, which if exceeded could result in excessive Lake Trout bycatch (Figure 18.2).
- Angler harvest is unknown but expected to be low given the MU remoteness.

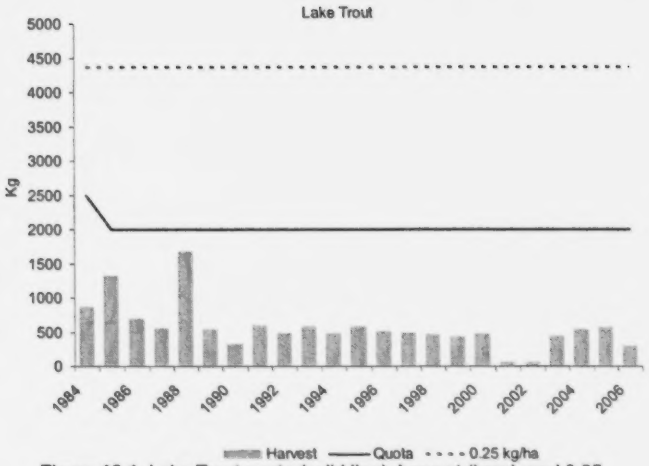


Figure 18.1. Lake Trout quota (solid line), harvest (bars), and 0.25 kg/ha harvest guideline (dashed line) for management unit 18.

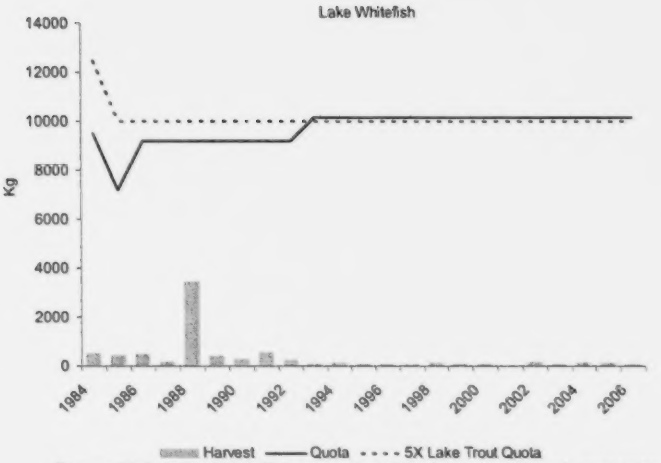


Figure 18.2. Lake Whitefish quota (solid line), harvest (bars), and Lake Whitefish harvest guideline (dashed line) for management unit 18.

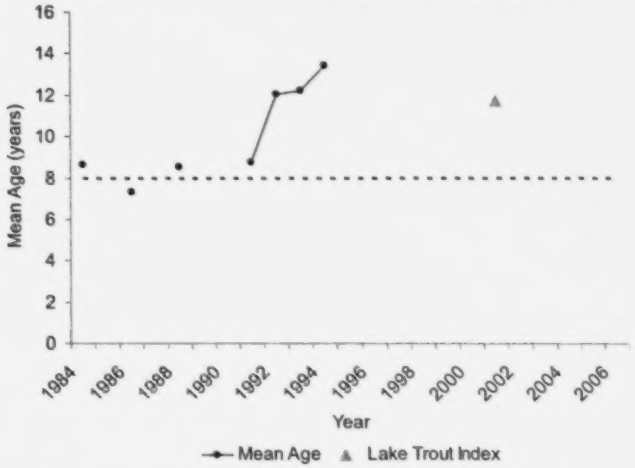


Figure 18.3. Lake Trout mean age (solid line) in the commercial harvest and Lake Trout index (triangle symbol) for management unit 18. Dashed line indicates a mean age of 8

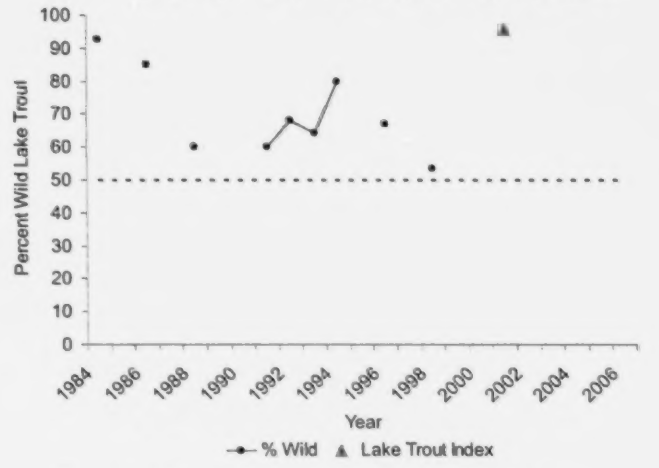


Figure 18.4. Percentage of wild Lake Trout (solid line) in the commercial harvest and Lake Trout index (triangle symbol for management unit 18. Dashed line indicates 50% wild Lake Trout.

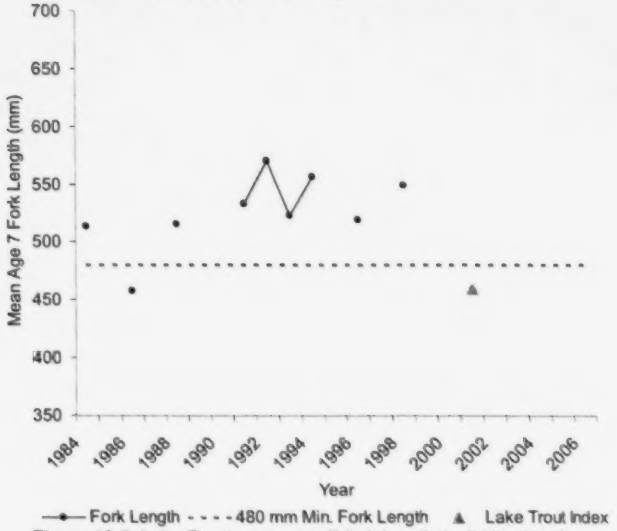


Figure 18.5. Lake Trout mean age 7 fork length (solid line) in the commercial harvest and Lake Trout index (triangle symbol) for management unit 18. Dashed line indicates a 480 mm fork length.

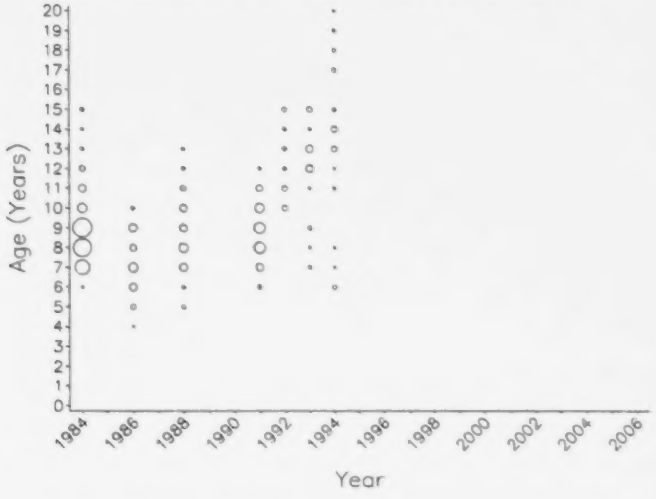


Figure 18.6. Bubble plot of the Lake Trout age distribution in the commercial harvest for management unit 18. Relative size of bubble represents the proportion of fish at that age.

Management Unit 19

RECOMMENDATIONS

- **Stocking is not recommended.**
- Maintain regular index assessment to monitor stock status.
- If native Lake Trout decline such that they are <50% of the index survey catch and mean age of native fish is <8 years, ensure this finding is communicated to the Lake Manager.
- If Lake Trout stocks decline due to an excessive unregulated harvest, work to achieve a harvest agreement with the First Nation before initiating rehabilitative stocking.
- Stocking of this MU is problematic due to its remoteness and the expense of doing so. If stocking is directed consider **pulse stocking** using Slate Island strain yearlings at offshore locations every 2 to 3 years.

Zone 19 Area: (ha)	
>50 fa	45,717
<50 fa	26,510
Total	71,227

Stocking direction 1992-2006

- Stocking was not required due to remote location and low risk of exploitation at the time.

Table 19.1. Recommended stocking rate, number stocked, and actual stocking rate from 1992 to 2006.

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Recommended stocking rate[1]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Actual # stocked	70851	60933	0	0	0	0	0	0	0	0	0	0	0	0	0
Actual stocking rate	6.28	3.48	-	-	-	-	-	-	-	-	-	-	-	-	-

[1]Stocking rate units are number/ha

Action to date

- No stocking has occurred since 1993.
- Assessment of Lake Trout stocks occurred in 2002.
- Commercial harvest is very small and commercial catch sampling has not occurred since 1996.

Stock Status

- Annual mean age of the commercial harvest since 1993 is not known (Figure 19.3).
- Trout in the 2002 index assessment were >50% wild (Figure19.4).
- Mean fork length of age 7 fish relative to the 480 mm benchmark for the commercial harvest was achieved prior to 1996 but is unknown since (Figure 19.5).
- Age class representation since 1992 is unknown (Figure 19.6).

Risk

- Recent commercial stock status data and lamprey wounding rates are not available.
- Exploitation risk is low as recent commercial harvests are well below the TACC and the 0.25 kg/ha harvest guideline (Figure 19.1).
- Whitefish harvest is well below the TACC and recommended 0.25 kg/ha harvest guideline, which if exceeded could result in excessive Lake Trout bycatch (Figure 19.2).
- Angler harvest risk is unknown but expected to be low given MU remoteness.

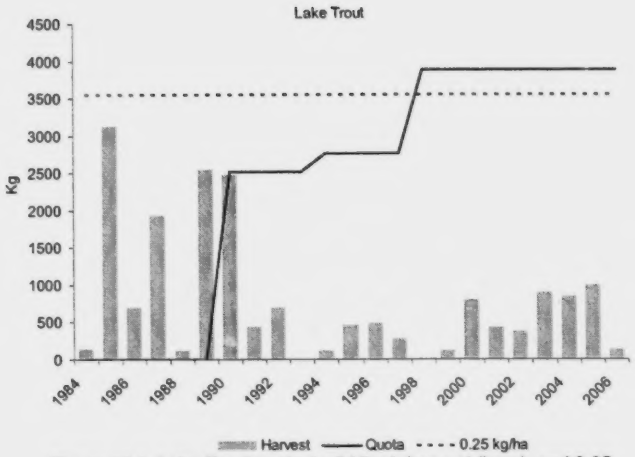


Figure 19.1. Lake Trout quota (solid line), harvest (bars), and 0.25 kg/ha harvest guideline (dashed line) for management unit 19.

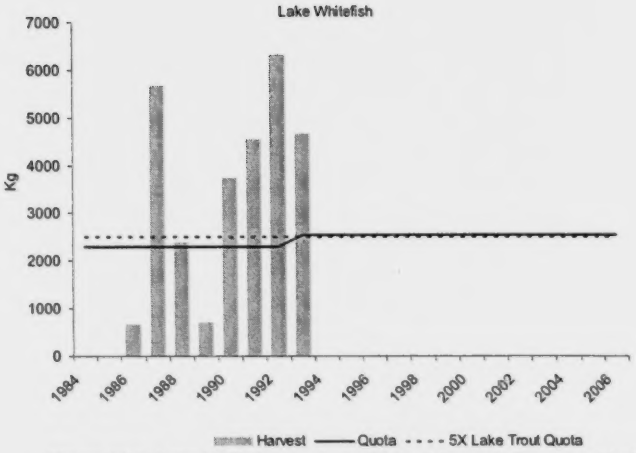


Figure 19.2. Lake Whitefish quota (solid line), harvest (bars), and Lake Whitefish harvest guideline (dashed line) for management unit 19.

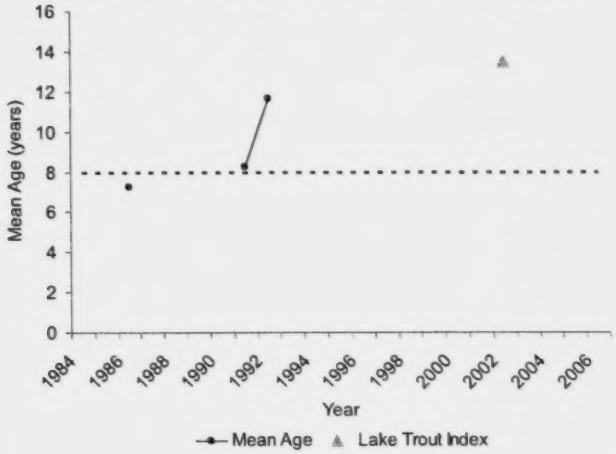


Figure 19.3. Lake Trout mean age (solid line) in the commercial harvest and Lake Trout index (triangle symbol) for management unit 19. Dashed line indicates a mean age of 8.

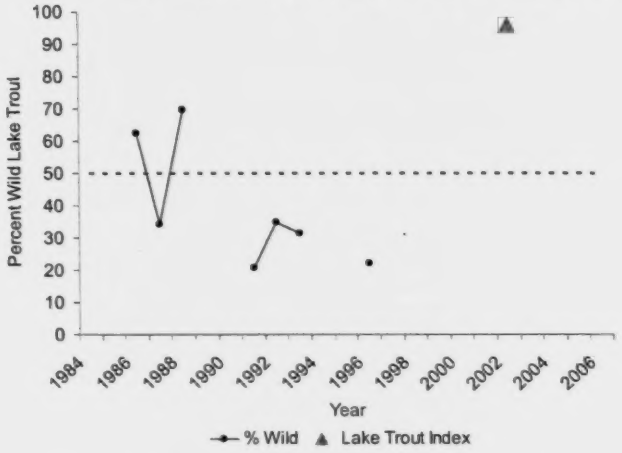


Figure 19.4. Percentage of wild Lake Trout (solid line) in the commercial harvest and Lake Trout index (triangle symbol) for management unit 19. Dashed line indicates 50% wild Lake Trout.

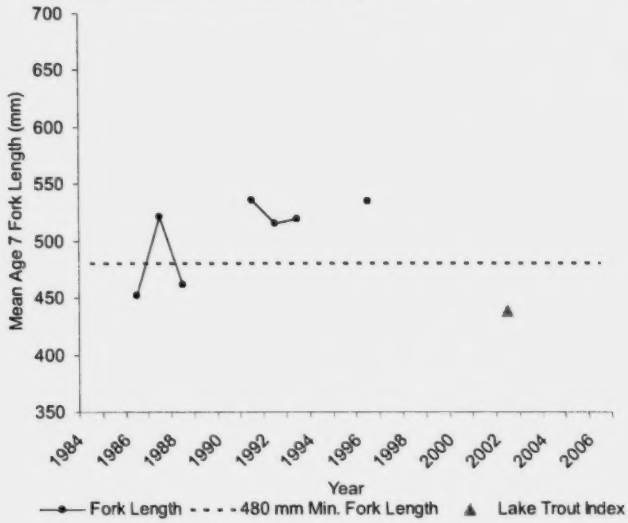


Figure 19.5. Lake Trout mean age 7 fork length (solid line) in the commercial harvest and Lake Trout index (triangle symbol) for management unit 19. Dashed line indicates a 480 mm fork length.

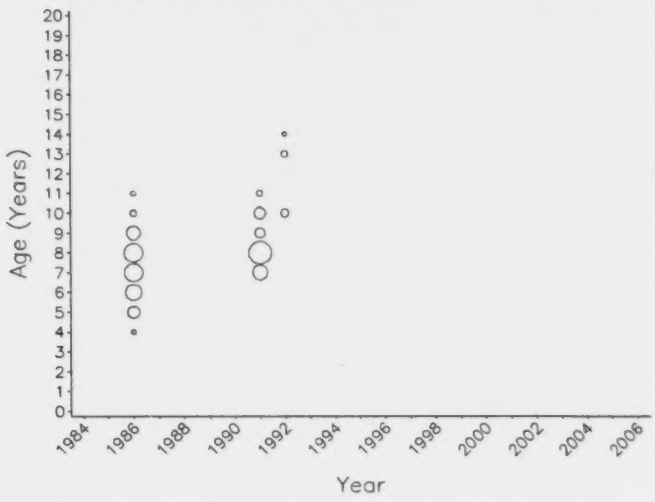
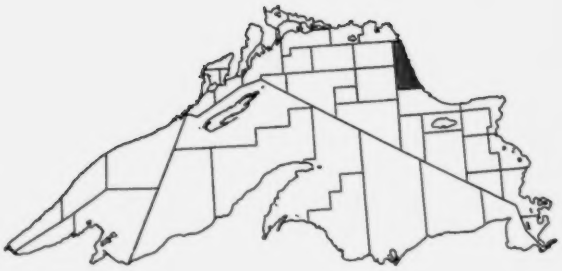


Figure 19.6. Bubble plot of the Lake Trout age distribution in the commercial harvest for management unit 19. Relative size of bubble represents the proportion of fish at that age.

Management Unit 23



RECOMMENDATIONS

- **Stocking is not recommended.**
- Maintain frequent regular index assessment to monitor stock status.
- If native Lake Trout decline such that they are <50% of the index survey catch and mean age of native fish is <8 years, ensure this finding is communicated to the Lake Manager.
- Under an at risk stock status condition do not initiate stocking unless a harvest agreement with First Nation commercial fishers is in place.
- Stocking of this MU is problematic due to its remoteness and the expense of doing so. If stocking is directed consider **pulse stocking** using Slate Island strain yearlings at offshore locations every 2 to 3 years.

MU 23 Area: (ha)	
>50 fa	89,604
<50 fa	10,240
Total	99,844

Stocking direction 1992-2006

- Stocking was not required due to remote location and low risk of exploitation.

Table 23.1. Recommended stocking rate, number stocked, and actual stocking rate from 1992 to 2006.

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Recommended stocking rate[1]															
Actual # stocked	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Actual stocking rate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

[1]Stocking rate units are number/ha

Action to date

- This MU has never been stocked
- Assessment of Lake Trout stocks occurred in 2002
- Recent commercial harvest is unreported and commercial catch sampling has not occurred since 1991

Stock Status

- Mean age in the commercial harvest record was >8 years from1989 to 1992 and in the 2002 index assessment (Figure 23.3).
- Trout in the 2002 index assessment were all wild (Figure 23.4).
- Commercial harvest mean fork length of age 7 fish <480 mm benchmark prior to 1992 and is unknown since (Figure 23.5).
- Age class representation since 1990 is unknown (Figure 23.6).

Risk

- Recent commercial stock status data and lamprey wounding rates are not available.
- Exploitation may be a risk due to unregulated native commercial fishery. Commercial harvest rates are unknown (Figure 23.1).
- Whitefish harvest is at or above TACC and not reaching recommended 0.25 kg/ha harvest guideline, which if exceeded could result in excessive Lake Trout bycatch (Figure 23.2).
- Angler harvest risk is unknown but expected to be low given MU remoteness.

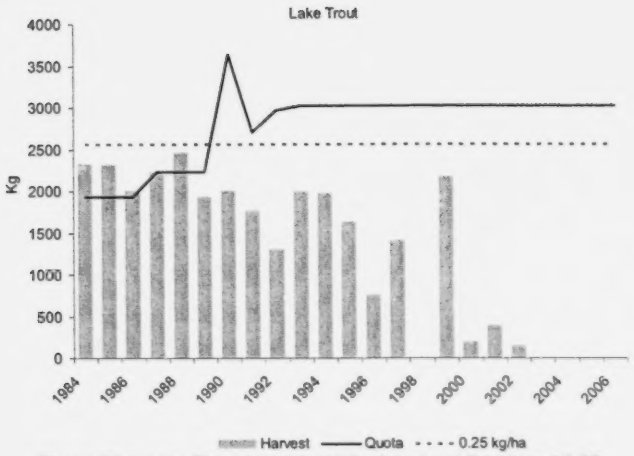


Figure 23.1. Lake Trout quota (solid line), harvest (bars), and 0.25 kg/ha harvest guideline (dashed line) for management unit 23.

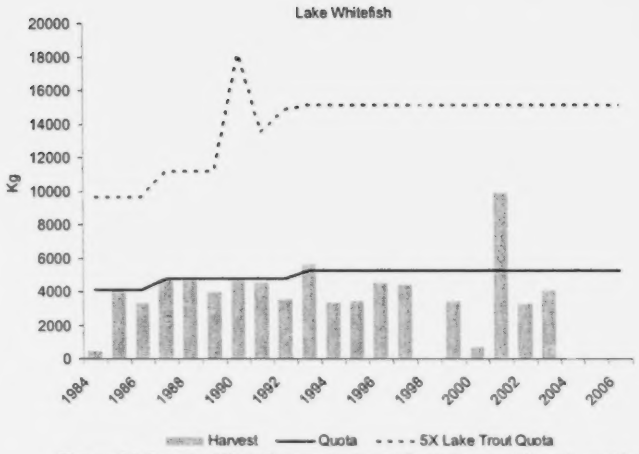


Figure 23.2. Lake Whitefish quota (solid line), harvest (bars), and Lake Whitefish harvest guideline (dashed line) for management unit 23.

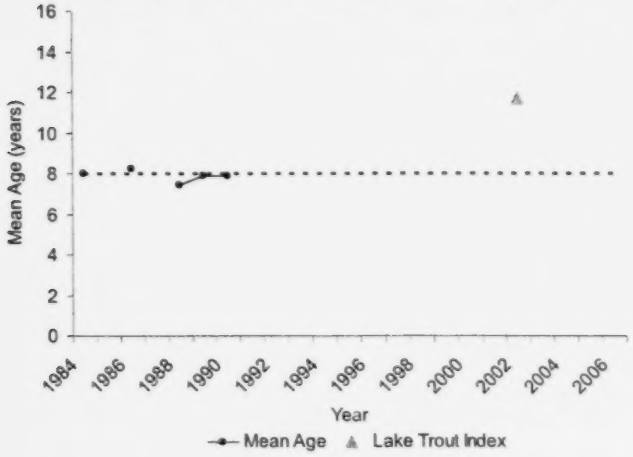


Figure 23.3. Lake Trout mean age (solid line) in the commercial harvest and Lake Trout index (triangle symbol) for management unit 23. Dashed line indicates a mean age of 8.

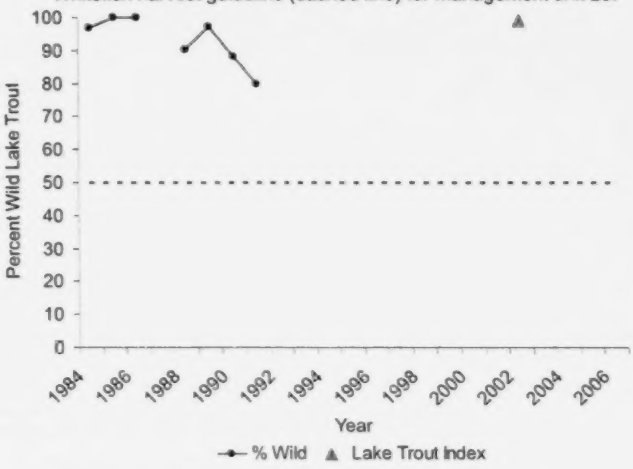


Figure 23.4. Percentage of wild Lake Trout (solid line) in the commercial harvest and Lake Trout index (triangle symbol) for management unit 23. Dashed line indicates 50% wild Lake Trout.

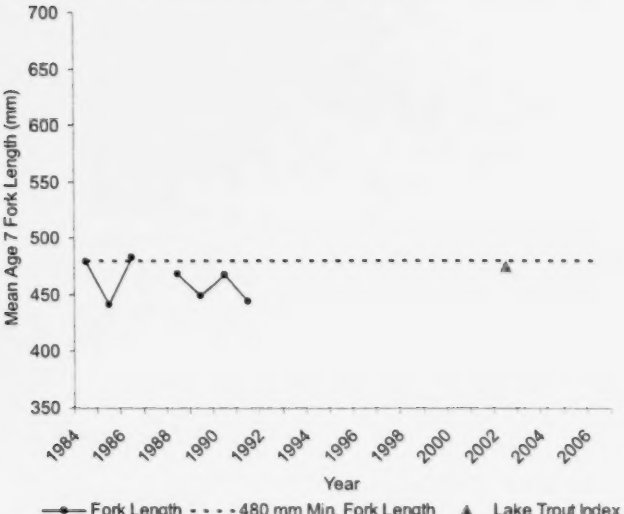


Figure 23.5. Lake Trout mean age 7 fork length (solid line) in the commercial harvest and Lake Trout index (triangle symbol) for management unit 23. Dashed line indicates a 480 mm fork length.

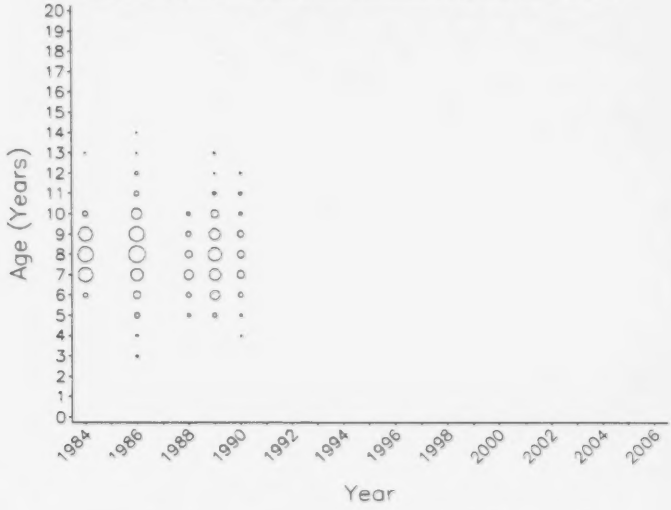
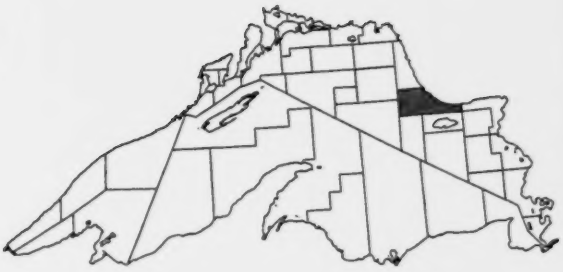


Figure 23.6. Bubble plot of the Lake Trout age distribution in the commercial harvest for management unit 23. Relative size of bubble represents the proportion of fish at that age.

Management Unit 24



RECOMMENDATIONS

- **Stocking is not recommended**
- Maintain regular index assessment to monitor stock status.
- If native Lake Trout decline such that they are <50% of the index survey catch and mean age of native fish is <8 years, ensure this finding is communicated to the Lake Manager.
- Under an at risk stock status condition do not initiate stocking unless a harvest agreement with First Nation commercial fishers is in place.
- Stocking of this MU is problematic due to its remoteness and the expense of doing so. If stocking is directed consider **pulse stocking** using Slate Island strain yearlings at offshore locations every 2 to 3 years.

MU 24 Area: (ha)[1]	
>50 fa	107262
<50 fa	21969
Total	129,231

Stocking direction1992-2006

- Stocking was not required due to remote location and low risk of exploitation at the time.

Table 24.1. Recommended stocking rate, number stocked, and actual stocking rate from 1992 to 2006.

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Recommended stocking rate[2]															
Actual # stocked	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Actual stocking rate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

[2]Stocking rate units are number/ha

Action to date:

- No stocking has occurred.
- Assessment of Lake Trout stocks occurred in 2000.
- Recent commercial harvest is unreported and commercial catch sampling has not occurred since 1992

Stock Status

- Mean age in the commercial harvest record was ≥ 8 years from1989 to 1992 and in the 2002 index assessment (Figure 24.3).
- Trout in the commercial harvest records and 2002 index assessment were all wild (Figure 24.4).
- Commercial harvest mean fork length of age 7 fish <the 480 mm benchmark prior to 1995 and is unknown since (Figure 24.5).
- Age class representation since 1991 is unknown (Figure 24.6).

[1]MU 24 estimated areas were derived from USGS GIS data. The areas <>50 fa are approximate and were estimated by summing the proportion of 5 minute grids within the management unit <>50 fa on a nautical chart. The proportion of the management unit was then multiplied by the total area of the MU.

Risk

- Recent commercial stock status data and lamprey wounding rates are not available.
- Exploitation may be a risk due to unregulated native commercial fishery: commercial harvest rates are unknown (Figure 24.1).
- Whitefish harvest is approaching the TACC and not reaching recommended 0.25 kg/ha harvest guideline, which if exceeded could result in excessive Lake Trout bycatch (Figure 24.2).
- Angler harvest risk is unknown but expected to be low given MU remoteness.

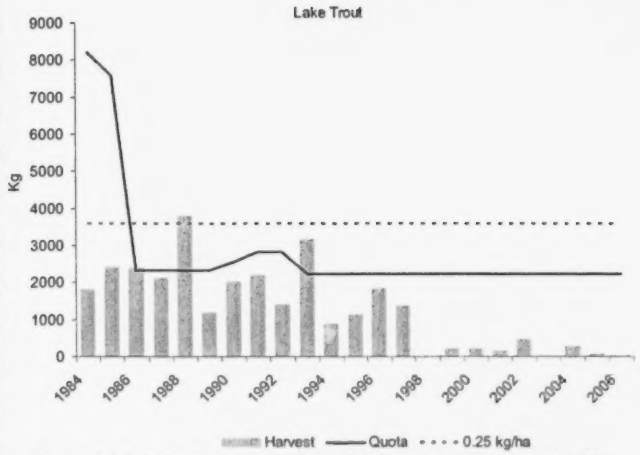


Figure 24.1. Lake Trout quota (solid line), harvest (bars), and 0.25 kg/ha harvest guideline (dashed line) for management unit 24.

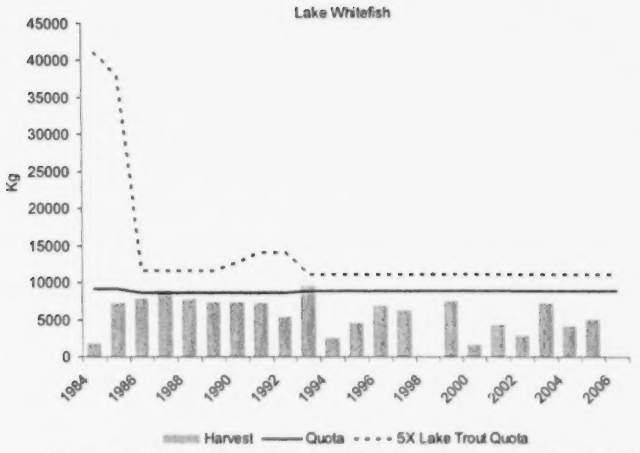


Figure 24.2. Lake Whitefish quota (solid line), harvest (bars), and Lake Whitefish harvest guideline (dashed line) for management unit 24.

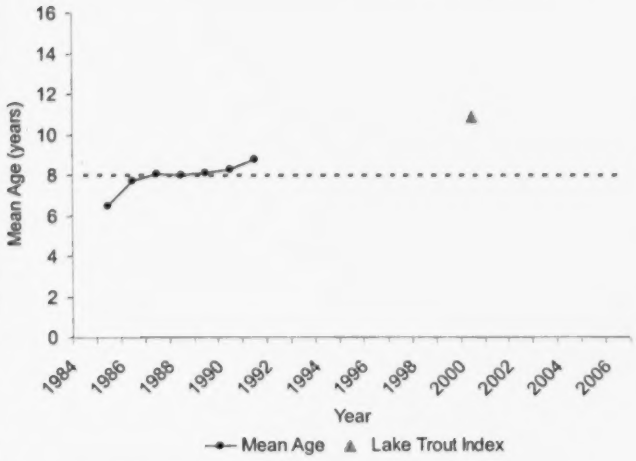


Figure 24.3. Lake Trout mean age (solid line) in the commercial harvest and Lake Trout index (triangle symbol) for management unit 24. Dashed line indicates a mean age of 8

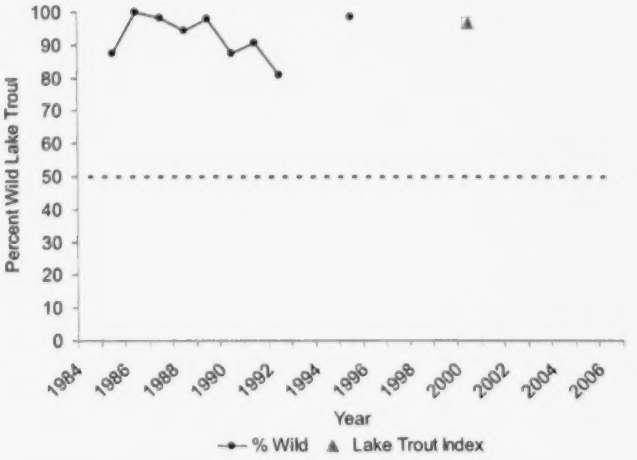


Figure 24.4. Percentage of wild Lake Trout (solid line) in the commercial harvest and Lake Trout index (triangle symbol) for management unit 24. Dashed line indicates 50% wild Lake Trout.

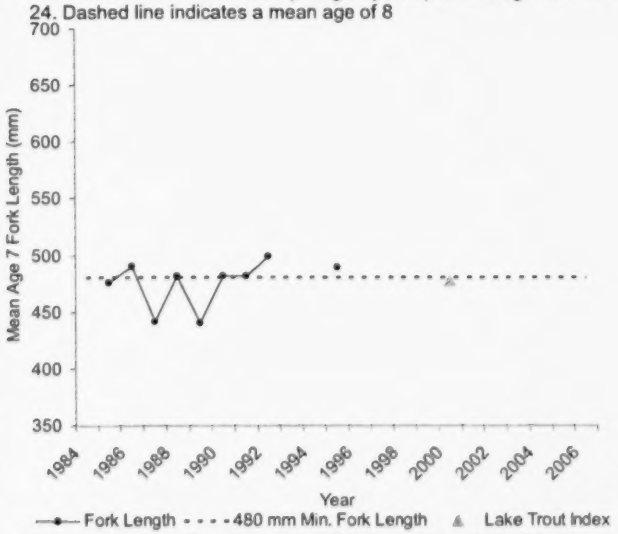


Figure 24.5. Lake Trout mean age 7 fork length (solid line) in the commercial harvest and Lake Trout index (triangle symbol) for management unit 24. Dashed line indicates a 480 mm fork length.

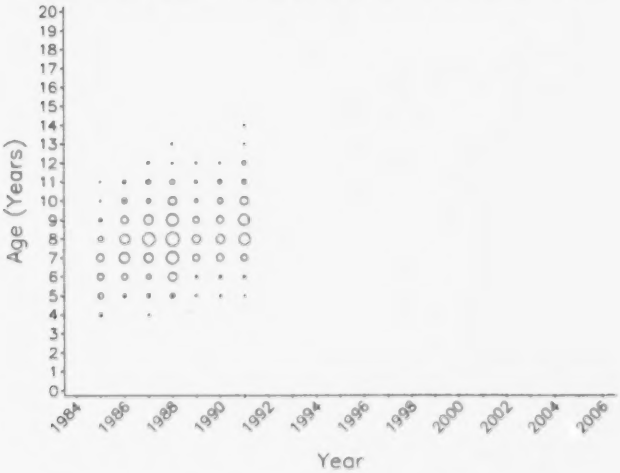


Figure 24.6. Bubble plot of the Lake Trout age distribution in the commercial harvest for management unit 24. Relative size of bubble represents the proportion of fish at that age.

Management Unit 28

MU 28 Area: (ha)	
>50 fa	45,248
<50 fa	43,661
Total	88,909

RECOMMENDATIONS

- **Stocking is not recommended.**
- Maintain regular index assessment to monitor stock status.
- If native Lake Trout decline such that they are <50% of the commercial harvest and mean age of native fish is < 8 years, ensure this finding is communicated to the Lake Manager.
- Under an at risk stock status condition do not initiate stocking unless a harvest agreement with First Nation commercial fishers is in place.
- If stocking is recommended, stock with Michipicoten strain stock at a rate of 3.5 yearlings per hectare (152,813) for 5 years and then drop to 2.3 yearlings per hectare (100,420).

Stocking direction 1992-2006

- Discontinue stocking yearlings.
- Stock 500,000 sac-fry at the University River with native river run stock (Mishibishu) for 4 years followed by 50,000 yearlings for 4 years.

Table 28.1. Recommended stocking rate, number stocked, and actual stocking rate from 1992 to 2006.

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Recommended stocking rate[1]															
Actual # stocked	88776	14639	0	0	0	1500	0	0	0	0	0	0	0	0	0
Actual stocking rate	2.03	0.34	-	-	-	0.03	-	-	-	-	-	-	-	-	-

[1]Stocking rate units are number/ha

Action to date

- No yearling stocking occurred after 1990 with the exception of surplus hatchery fish in1997.
- Field investigation of the status of wild river run Lake Trout in the University (Dog) River was undertaken in 1996, 2001 and 2005. It was decided that there were sufficient wild adult fish to support rehabilitation from the significant losses in the 1950s by commercial fishing and Sea Lampreys (Petzold, 2002, Chong 2006). No sac fry stocking was undertaken.
- Lake Trout index netting occurred in 1998.

Stock Status

- Mean age in the commercial harvest record was at or slightly above 8 years (Figure 28.3).
- Trout in the commercial harvest and in the 1998 index assessment have all been wild fish (Figure 28.4).
- Mean fork length of age 7 fish has been <the 480 mm benchmark (Figure 28.5).
- Age classes represented in commercial harvest record good but numbers aged are small (Figure 28.6).

Risk

- Recent commercial stock status data and lamprey wounding rates are not available.
- Unregulated native fishery occasionally exceeds the TACC (Figure 28.1).
- Recent whitefish harvest is at or above TACC and exceeded recommended 0.25 kg/ha harvest guideline, which if exceeded could result in excessive Lake Trout bycatch (Figure 28.2).
- Lack of recent commercial data and index data means lamprey predation is not being tracked.
- Angler harvest risk is unknown but expected to be low given MU remoteness from a large population centre.

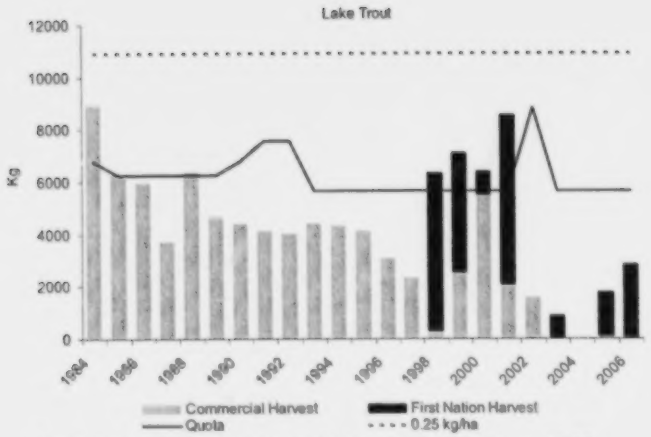


Figure 28.1. Lake Trout quota (solid line), harvest (bars), and 0.25 kg/ha harvest guideline (dashed line) for management unit 28.

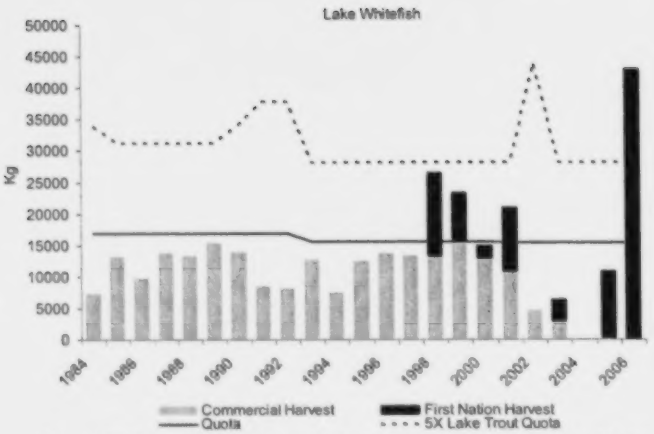


Figure 28.2. Lake Whitefish quota (solid line), harvest (bars), and Lake Whitefish harvest guideline (dashed line) for management unit 28.

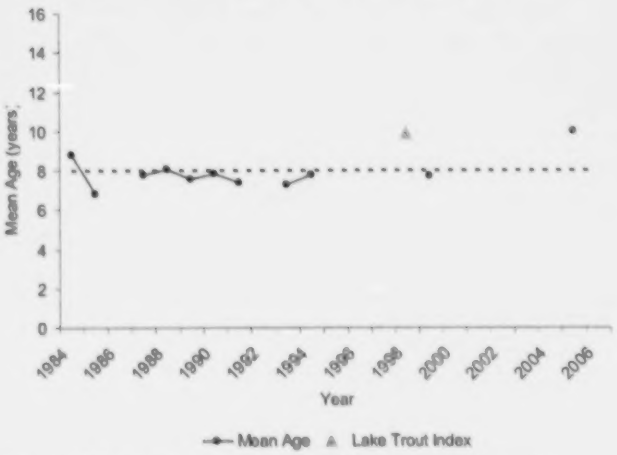


Figure 28.3. Lake Trout mean age (solid line) in the commercial harvest and Lake Trout index (triangle symbol) for management unit 28. Dashed line indicates a mean age of 8

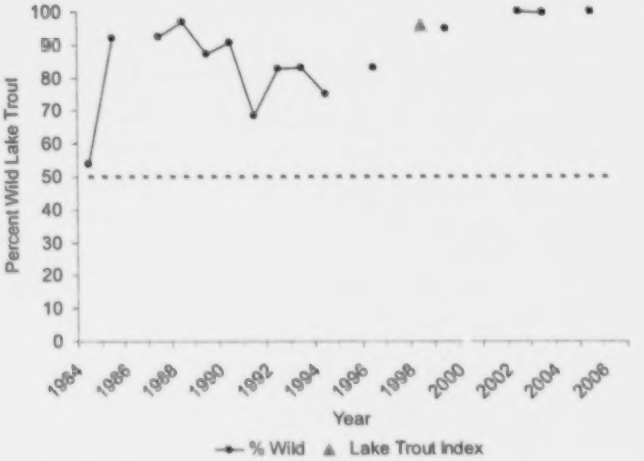


Figure 28.4. Percentage of wild Lake Trout (solid line) in the commercial harvest and Lake Trout index (triangle symbol) for management unit 28. Dashed line indicates 50% wild Lake Trout.

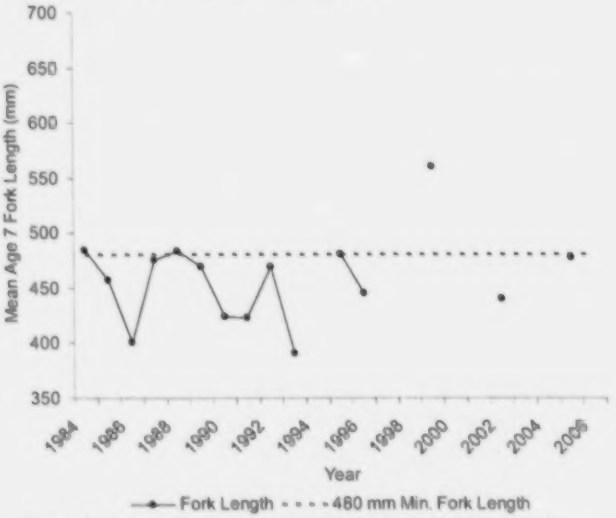


Figure 28.5. Lake Trout mean age 7 fork length (solid line) in the commercial harvest for management unit 28. Dashed line indicates a 480 mm fork length.

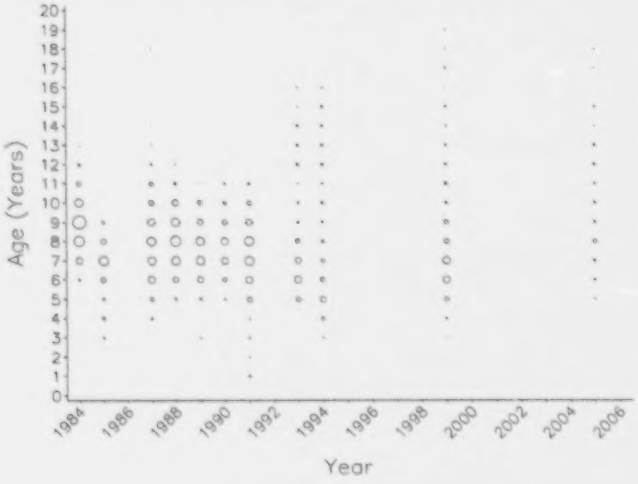


Figure 28.6. Bubble plot of the Lake Trout age distribution in the commercial harvest for management unit 28. Relative size of bubble represents the proportion of fish at that age

Management Unit 31

MU 31 Area: (ha)	
>50 fa	38,306
<50 fa	51,997
Total	90,303

RECOMMENDATIONS

- **Continue to defer rehabilitative stocking** until an agreement on sustainable harvest is reached with First Nation commercial fishers.
- Maintain regular index assessment to monitor stock status
- Upon harvest agreement with First Nation fishers, and if index assessment warrants rehabilitative stocking, stock Michipicoten strain Lake Trout at 3.5 fish per ha.
- When wild Lake Trout make up 50% of the commercial harvest reduce the stocking rate to 2.3 fish per ha.
- When native Lake Trout are >50% of the index survey catch and mean age of native fish is greater than 8 years cease stocking.

Stocking direction1992-2006

- Using Michipicoten strain stock at a rate of 3.5 yearlings per hectare (181,989 fish) for 5 years and then drop to 2.3 yearlings per hectare (119,593 fish).

Table 31.1. Recommended stocking rate, number stocked, and actual stocking rate from 1992 to 2006.

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Recommended stocking rate[1]	3.5	3.5	3.5	3.5	3.5	3.5	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	0
Actual # stocked	181869	149909	218693	177041	157151	146755	92749	151522	113941	176883	104455	161892	131786	114855	0
Actual stocking rate	3.50	2.88	4.21	3.40	3.02	2.82	1.78	2.91	2.19	3.40	2.01	3.11	2.53	2.21	0

[1]Stocking rate units are number/ha

Action to date

- A conservation concern for wild fish was declared in 1997 when index netting found 99% of trout were stocked fish <8 years old, confirming concern that stocked fish were not surviving long enough to spawn and contribute to rehabilitation of wild stocks (Petzold, 1997). Unregulated commercial harvest of Lake Trout by First Nation commercial fishers was considered the primary cause (Figure 31.1).
- Monitoring of previously unreported First Nation harvest was initiated in 1998 (Figure 31.1).
- The target stocking rate remained at 3.5 fish/ha. until 2006 when it was decided to defer stocking until a harvest agreement with First Nation commercial fishers was reached.
- Lake Trout index assessment occurred in 1992 and 1998.

Stock Status

- Mean age data of Lake Trout in the commercial fishery is too limited to be useful (Figure 31.3).
- While per cent wild fish in Figure 31.4 appears high, sample size is small and index assessment catch is <50% wild.
- Mean fork length of age 7 fish greater than the 480 mm benchmark since 1999 (Figure 31.5).
- Annual age class representation has not been available in recent years (Figure 31.6).

Risk

- Recent commercial stock status data and lamprey wounding rates are not available.
- Unregulated native fishery occasionally exceeds the TACC (Figure 31.1).
- Recent whitefish harvest is at or above TACC and exceeds the recommended 0.25 kg/ha harvest guideline, which if exceeded could result in excessive Lake Trout bycatch (Figure 31.2).
- Lack of recent commercial data and index data means lamprey predation is not being tracked.
- Angler harvest risk is unknown but expected to be low given MU remoteness.

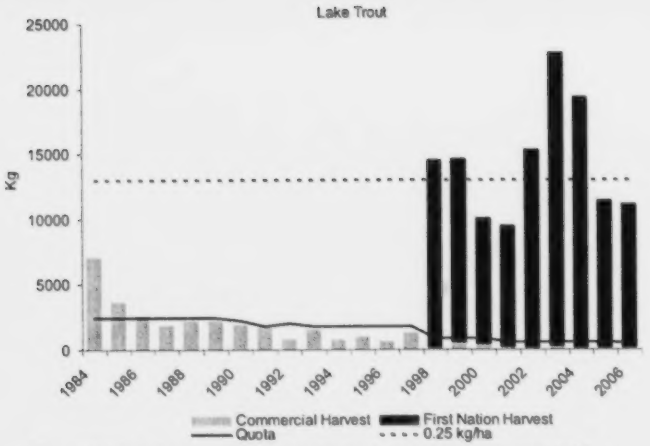


Figure 31.1. Lake Trout quota (solid line), harvest (bars), and 0.25 kg/ha harvest guideline (dashed line) for management unit 31.

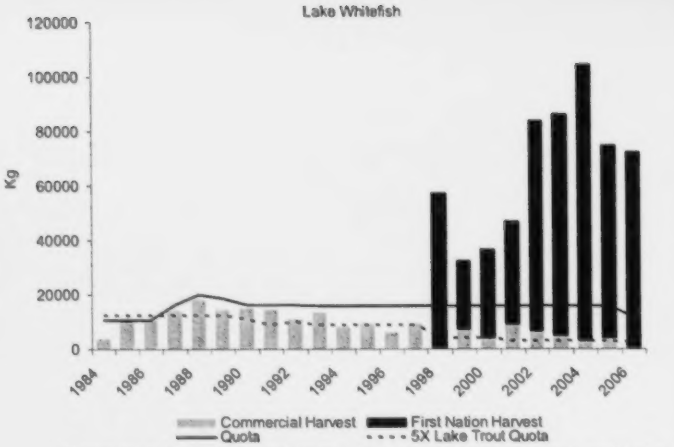


Figure 31.2. Lake Whitefish quota (solid line), harvest (bars), and Lake Whitefish harvest guideline (dashed line) for management unit 31.

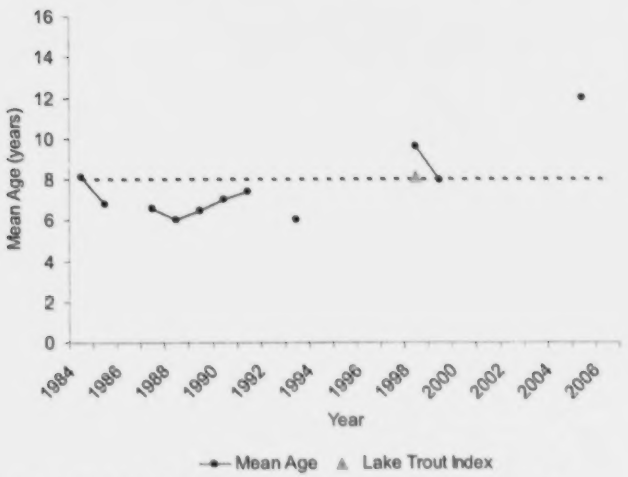


Figure 31.3. Lake Trout mean age (solid line) in the commercial harvest and Lake Trout index (triangle symbol) for management unit 31. Dashed line indicates a mean age of 8

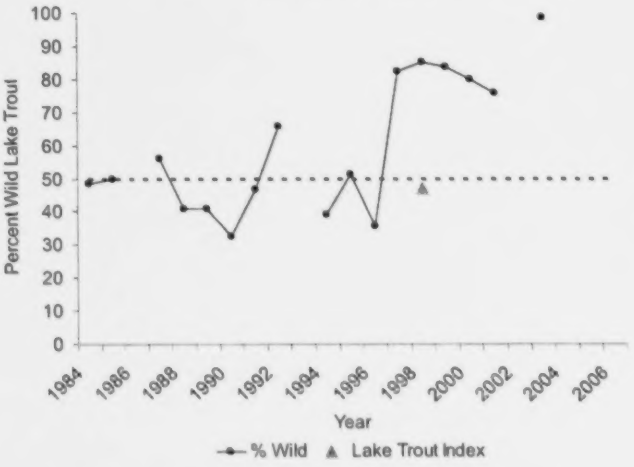


Figure 31.4. Percentage of wild Lake Trout (solid line) in the commercial harvest and Lake Trout index (triangle symbol) for management unit 31. Dashed line indicates 50% wild Lake Trout.

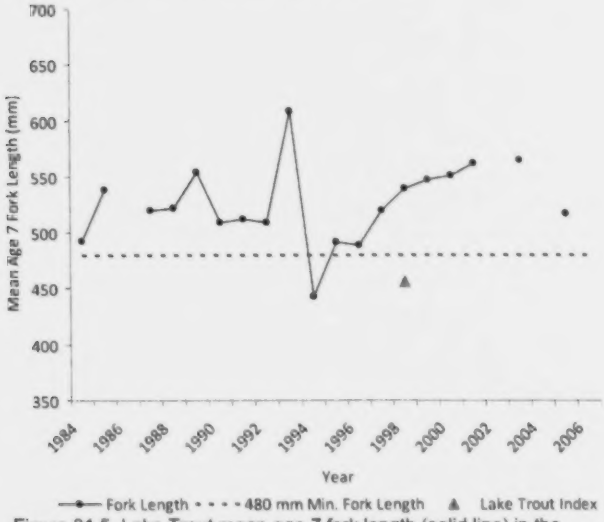


Figure 31.5. Lake Trout mean age 7 fork length (solid line) in the commercial harvest and Lake Trout index (triangle symbols) for management unit 31. Dashed line indicates a 480 mm fork length.

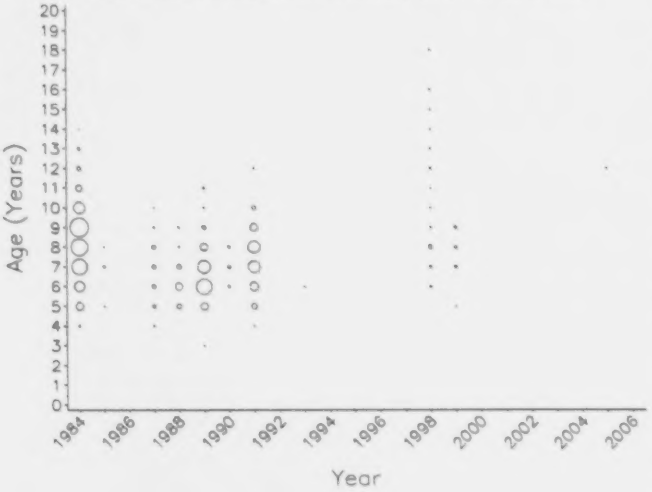
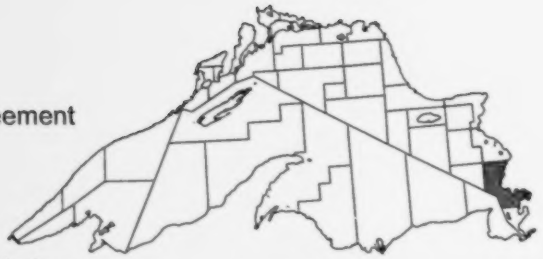


Figure 31.6. Bubble plot of the Lake Trout age distribution in the commercial harvest for management unit 31. Relative size of bubble represents the proportion of fish at that age.

Management Unit 33



MU 33 Area: (ha)	
>50 fa	41,022
<50 fa	90,707
Total	131,729

RECOMMENDATIONS

- **Continue to defer rehabilitative stocking** until an agreement on sustainable harvest is reached with First Nation commercial fishers.
- Maintain regular index assessment to monitor stock status
- Upon harvest agreement with First Nation fishers, and if index assessment warrants rehabilitative stocking, stock Michipicoten strain Lake Trout at 3.5 fish per ha.
- When wild Lake Trout make up 50% of the commercial harvest reduce the stocking rate to 2.3 fish per ha.
- When native Lake Trout are >50% of the index survey catch and mean age of native fish is >8 years cease stocking.
- **Review the advisability of continued stocking of inner Batchawana Bay following completion of Lake Trout habitat mapping for habitat availability.**

Stocking direction 1992-2006

- Using Michipicoten strain stock at a rate of 3.5 yearlings per hectare (31,7474 fish) for 5 years and then drop to 2.3 yearlings per hectare (20,8626 fish).

Table 33.1. Recommended stocking rate, number stocked, and actual stocking rate from 1992 to 2006.

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Recommended stocking rate[1]	3.5	3.5	3.5	3.5	3.5	3.5	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Actual # stocked	591235	217166	283262	241610	255794	347332	424946	476537	306136	328052	268685	321300	296897	266158	45207
Actual stocking rate	6.52	2.39	3.12	2.66	2.82	3.83	4.68	5.25	3.37	3.62	2.96	3.54	3.27	2.93	0.50

[1]Stocking rate units are number/ha

Action to date

- A conservation concern for wild fish was declared in 1997 when index netting found 99% of trout were stocked fish <8 years old, confirming concern that stocked fish were not surviving long enough to spawn and contribute to rehabilitation of wild stocks (Petzold, 1997). Unregulated commercial harvest of Lake Trout by First Nation commercial fishers was considered the primary cause (Figure 31.1).
- Monitoring of previously unreported First Nation harvest was initiated in 1998 (Figure 31.1).
- The target stocking rate remained at 3.5 fish/ha until 2006 when it was decided to defer stocking until a harvest agreement with First Nation commercial fishers was reached.
- Lake Trout index assessment occurred in 1997 and 2003.
- Lake Trout (40,000) continue to be stocked into Batchawana Bay to support the sport fishery.
- An angler open water creel was conducted in 1997 outside of Batchawana Bay. Lake Trout harvest was nil (Petzold 1997).

Stock Status

- Mean age data of Lake Trout in the commercial fishery is too limited to be useful (Figure 33.3).
- Trout in the 1997 index assessment were mostly stocked fish and in the 2003 index 78% were wild (Figure 33.4).
- In the 2006 commercial sampling <50% fish were wild (Figure 33.4).

- Mean fork length of age 7 fish ≥ the 480 mm benchmark since 1996 (Figure 33.5).
- No data on age classes represented in commercial harvest record since 1999 (Figure 33.6).

Risk

- Excessive exploitation is occurring due to unregulated commercial fishery exceeding TACC (Figure 33.1).
- Whitefish harvest has greatly exceeds TACC and recommended 0.25 kg/ha harvest guideline, which if exceeded could result in excessive Lake Trout bycatch (Figure 33.2)
- Angler harvest risk is nil based on the 1997 creel and lack of a Lake Trout targeted fishery since the survey.

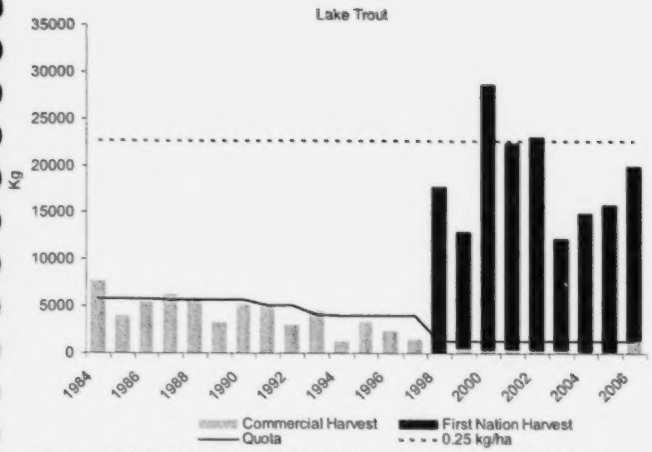


Figure 33.1. Lake Trout quota (solid line), harvest (bars), and 0.25 kg/ha harvest guideline (dashed line) for management unit 33.

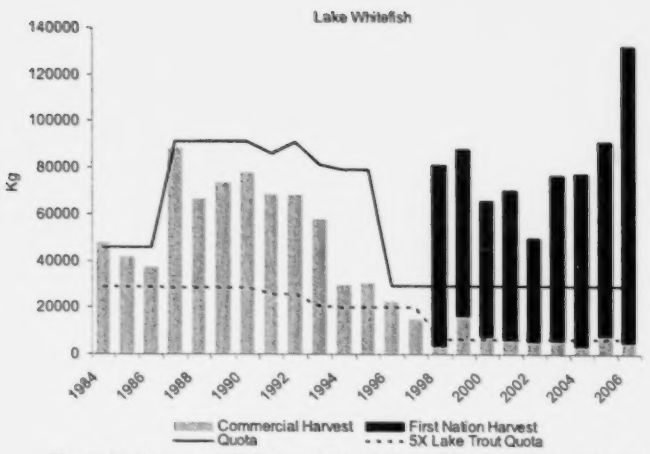


Figure 33.2. Lake Whitefish quota (solid line), harvest (bars), and Lake Whitefish harvest guideline (dashed line) for management unit 33.

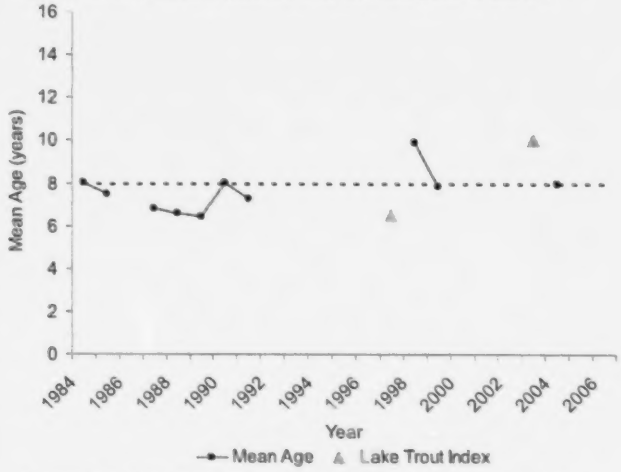


Figure 33.3. Lake Trout mean age (solid line) in the commercial harvest and Lake Trout index (triangle symbols) for management unit 33. Dashed line indicates a mean age of 8

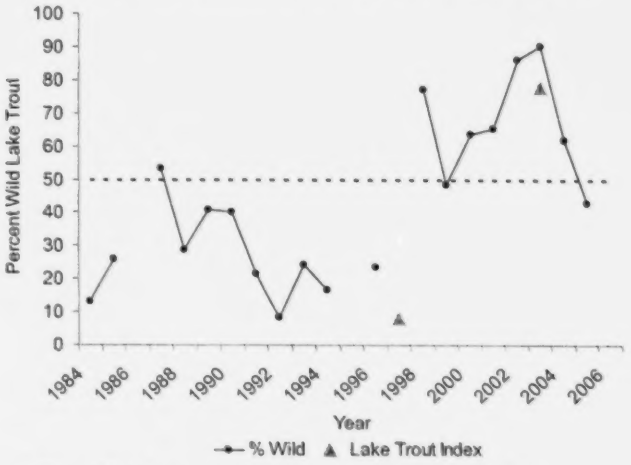


Figure 33.4. Percentage of wild Lake Trout (solid line) in the commercial harvest and Lake Trout index (triangle symbols) for management unit 33. Dashed line indicates 50% wild Lake Trout.

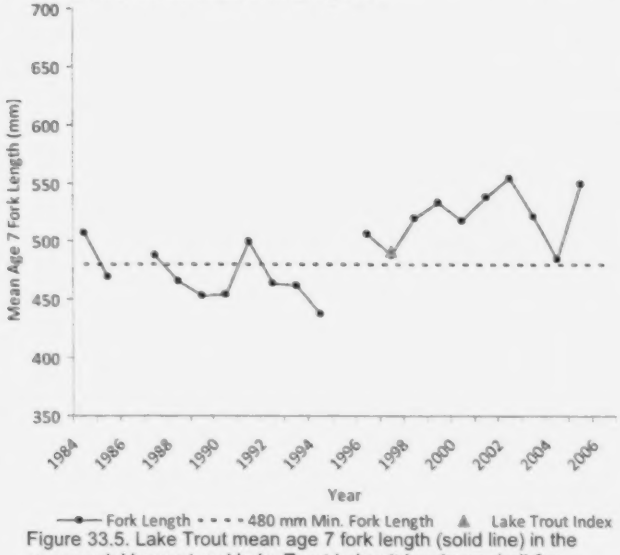


Figure 33.5. Lake Trout mean age 7 fork length (solid line) in the commercial harvest and Lake Trout index (triangle symbol) for management unit 33. Dashed line indicates a 480 mm fork length.

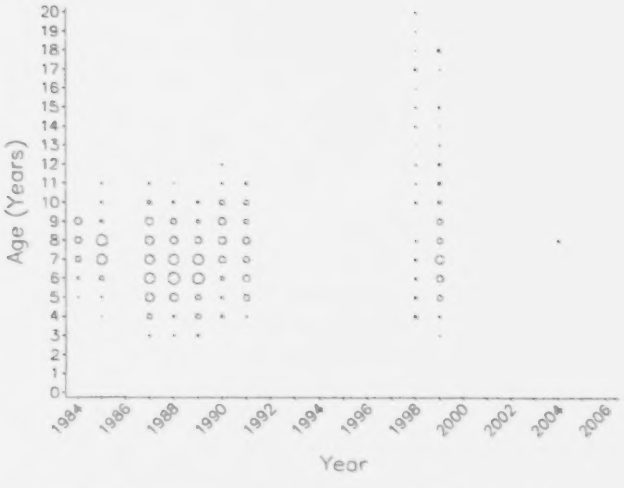


Figure 33.6. Bubble plot of the Lake Trout age distribution in the commercial harvest for management unit 33. Relative size of bubble represents the proportion of fish at that age.

Management Unit 34

RECOMMENDATIONS

- Continue to manage for Lake Trout in the absence of rehabilitative stocking until exploitation concerns with First Nation commercial fishing in this MU and in adjacent Michigan waters are resolved.
- Upon resolution adopt the stocking direction for MU 33.

MU 34 Area: (ha)	
>50 fa	3,043
<50 fa	44,409
Total	47,452

Stocking direction 1992-2006

- Continue to manage for Lake Trout in the absence of stocking until exploitation concerns in adjacent Michigan waters are resolved.

Table 34.1. Recommended stocking rate, number stocked, and actual stocking rate from 1992 to 2006.

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Recommended stocking rate[1]	stocking deferred due to exploitation concerns														
Actual # stocked	87713	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Actual stocking rate	1.98	-	-	-	-	-	-	-	-	-	-	-	-	-	-

[1]Stocking rate units are number/ha

Action

- No attempt has been made to secure a binational cooperative effort to decrease exploitation risk to date.
- Stocking ceased after 1992.
- Index surveys occurred in 1999 and 2004

Stock Status

- Mean age in the commercial harvest record and index catch well below 8 years (Figure 34.3)
- No wild Lake Trout are present (Figure 34.4)
- Mean fork length of age 7 fish at or >the 480 mm benchmark (Figure 34.5)
- No data on age classes represented in commercial harvest record since1995 (Figure 34.6)

Risk

- Excessive exploitation is occurring due to unregulated commercial fishery exceeding TACC (Figure 34.1)
- Whitefish harvest greatly exceeds TACC and recommended 0.25 kg/ha harvest guideline, which if exceeded could result in excessive Lake Trout bycatch (Figure 34.2)
- Lack of recent commercial data means lamprey predation is not being tracked annually
- Angler harvest risk is nil based on the 1997 angler creel survey and absence of a Lake Trout targeted fishery since the survey

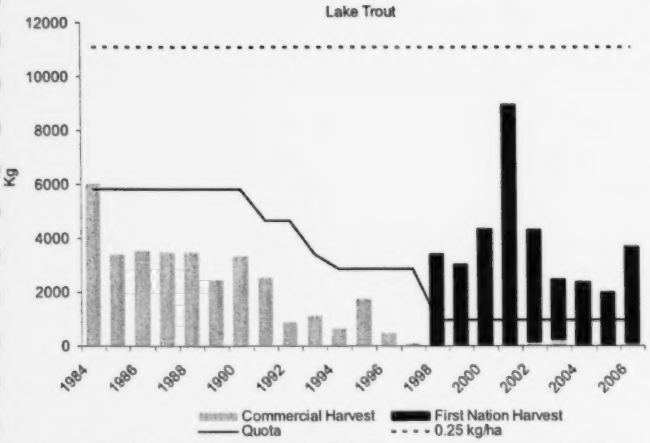


Figure 34.1. Lake Trout quota (solid line), harvest (bars), and 0.25 kg/ha harvest guideline (dashed line) for management unit 18.

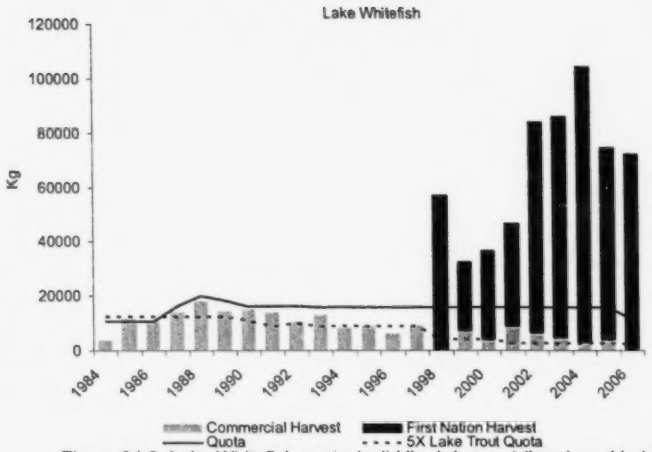


Figure 34.2. Lake Whitefish quota (solid line), harvest (bars), and Lake Whitefish harvest guideline (dashed line) for management unit 18.

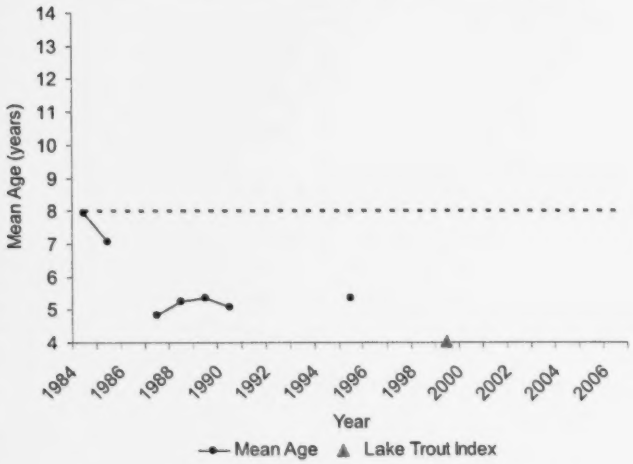


Figure 34.3. Lake Trout mean age (solid line) in the commercial harvest and Lake Trout index (triangle symbol) for management unit 18. Dashed line indicates a mean age of 8

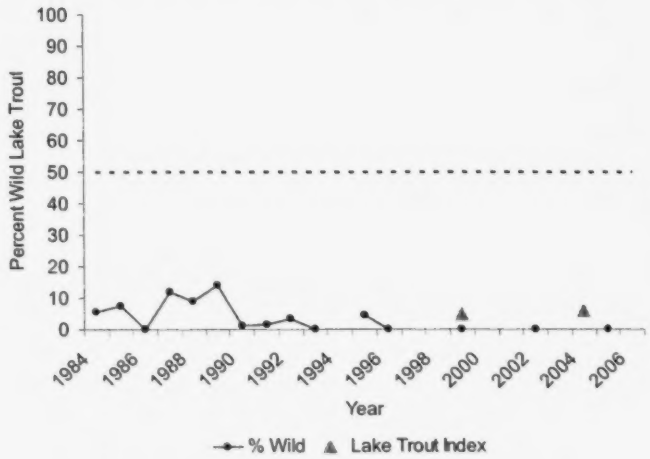


Figure 34.4. Percentage of wild Lake Trout (solid line) in the commercial harvest and Lake Trout index (triangle symbols) for management unit 18. Dashed line indicates 50% wild Lake Trout.

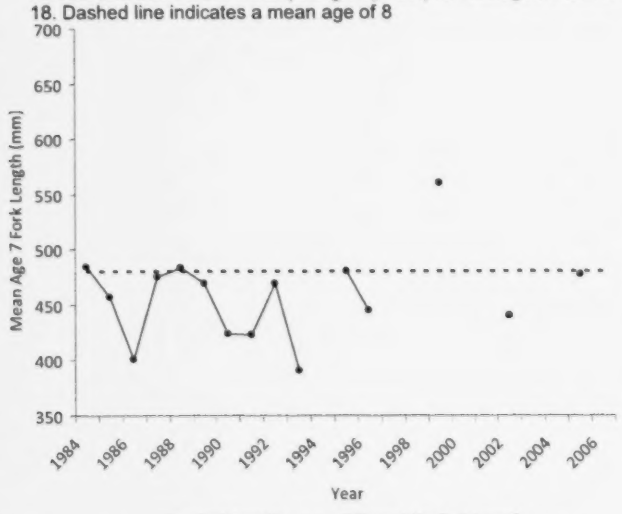


Figure 34.5. Lake Trout mean age 7 fork length (solid line) in the commercial harvest for management unit 18. Dashed line indicates a 480 mm fork length.

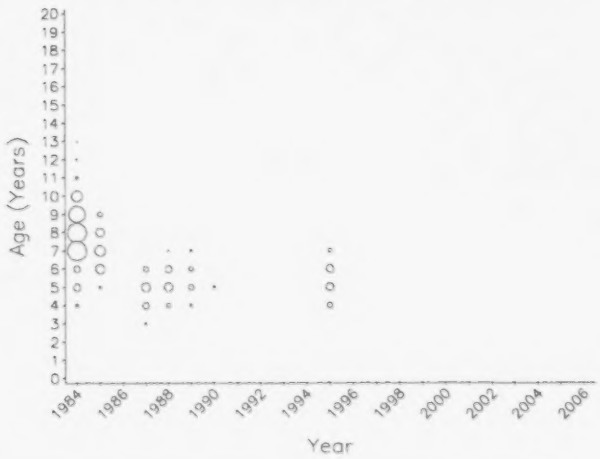


Figure 34.6. Bubble plot of the Lake Trout age distribution in the commercial harvest for management unit 18. Relative size of bubble represents the proportion of fish at that age

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